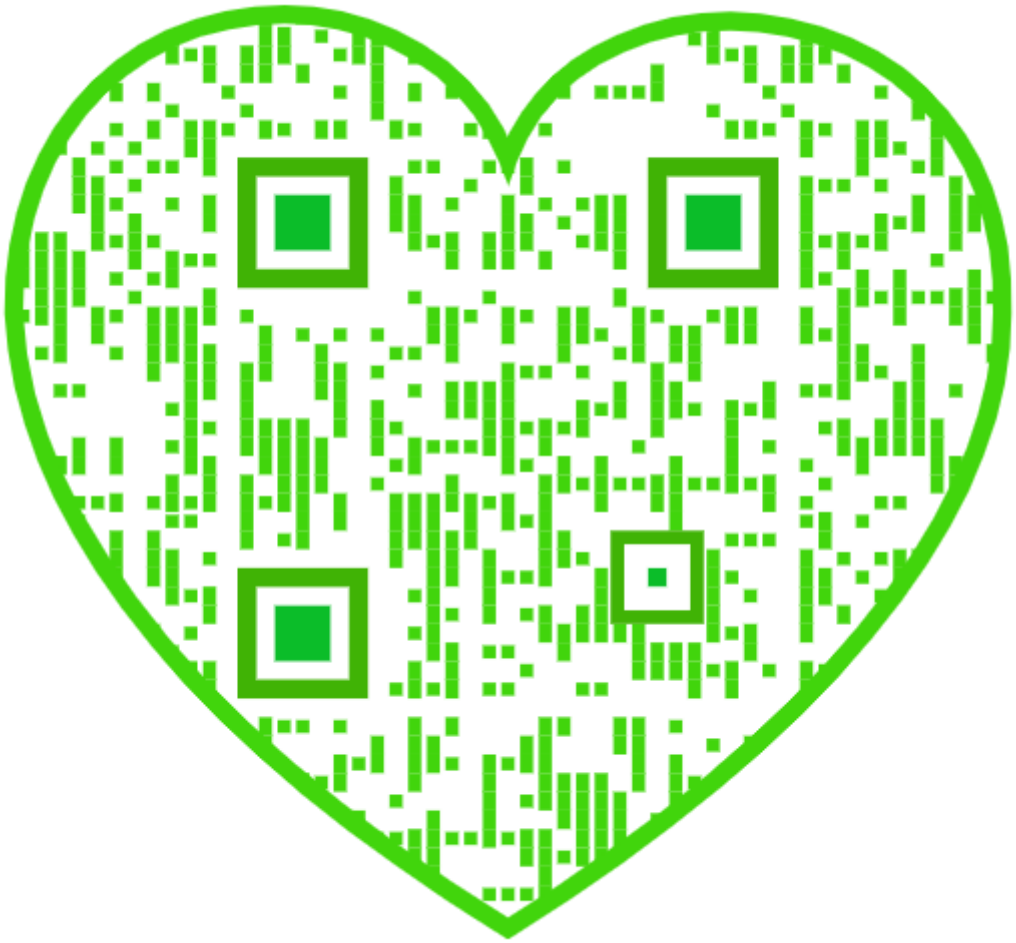

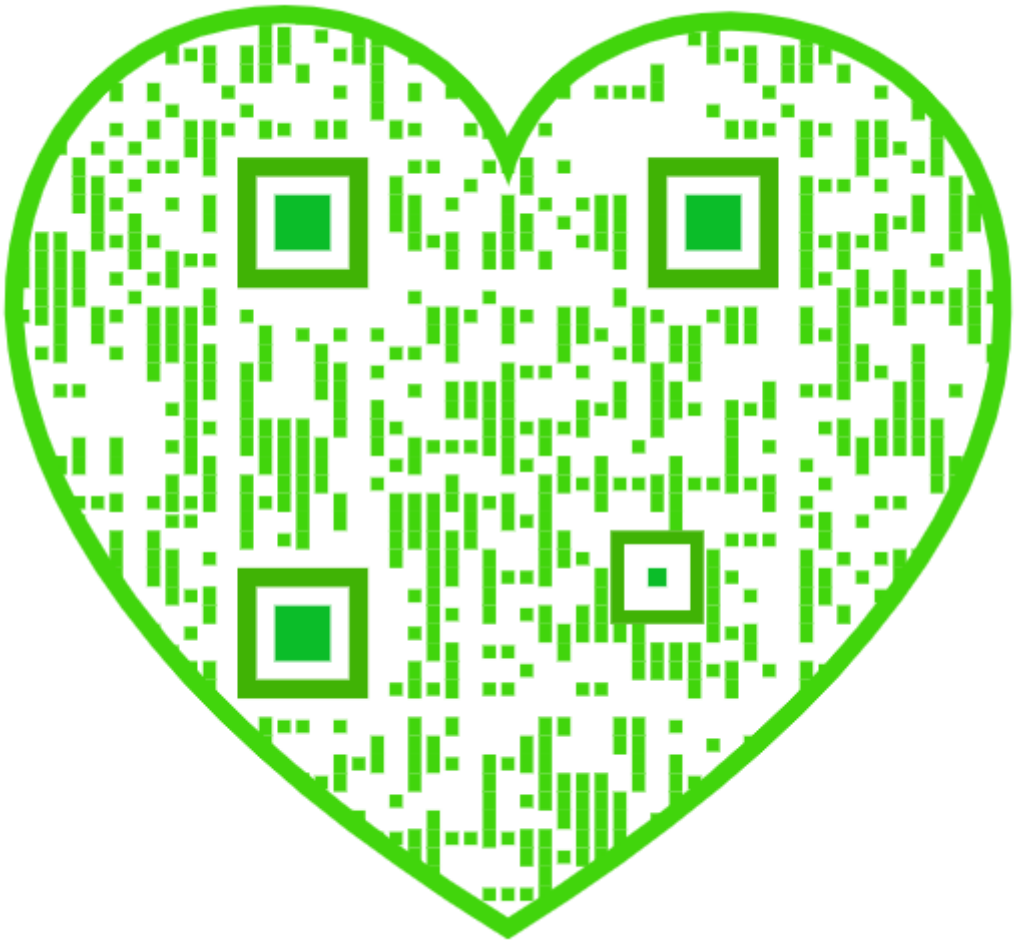

FIREPLACES

This little book is dedicated to

Benjamin, Count of Rumford

and to the fire that warms men's soles.

Return from the Hunt—Louis Leloir.

Collection of John Jacob Astor, New York.

Rumford, Sir Benjamin Thompson, count, 1753-1814

RUMFORD

FIREPLACES

AND

HOW THEY ARE MADE

BY

G. CURTIS GILLESPIE, M. E.
Architect

Containing Benjamin Count of Rumford's Essay on

"Proper Fireplace Construction"

A plea for a more general consideration of the form and proportion of a very much neglected feature of our Homes and Buildings, with nearly two hundred illustrations, including the original Rumford drawings, diagrams for fireplace construction, and numerous ancient and modern mantels and fireplaces, one hundred andiron designs and other details and fixtures together with Preface and explanatory notes.

NEW YORK
WILLIAM T. COMSTOCK
1906

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PREFACE

In the hope of making what otherwise might be a rather warm and dry subject more attractive and interesting, I have strewn promiscuously throughout these pages numerous pictures bearing upon fireplaces and mantels for some of which I am indebted to the John Lane Company, "The International Studio," outside cover, pages 42-156-192; "The Architectural Record" page 56, and to the "American Architect" page 33.

G. CURTIS GILLESPIE, M. E.
ARCHITECT

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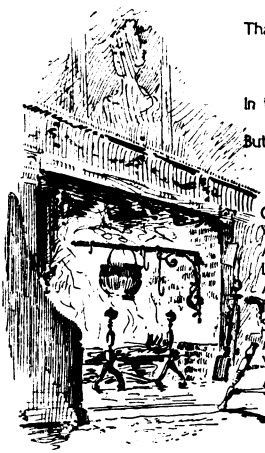
The Fireplace Crane



The lights are out, and gone are all the
guests
That thronging came with merriment
and jests
To celebrate the Hanging of the
Crane
In the new house, — into the night are
gone,
But still the fire upon the hearth burns
on,
And I alone remain.

O fortunate, O happy day,
When a new household finds its place
Among the myriad homes of earth,
Like a new star just sprung to birth,
And rolled on its harmonious way
Into the boundless realms of space!
So said the guests in speech and song,
As in the chimney, burning bright,
We hung the iron crane to-night,
And merry was the feast and long.

From "The Hanging of the Crane"

—LONGFELLOW.

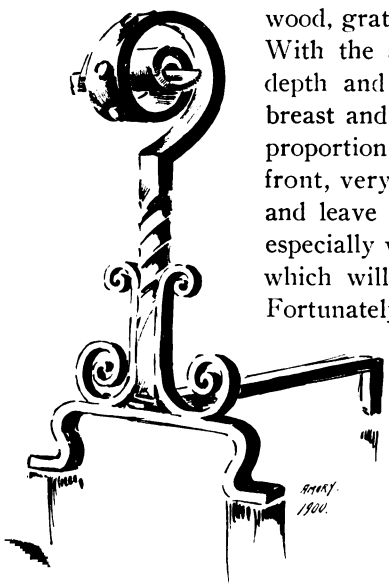
INTRODUCTION.

FROM the Aborigines' fire on a rock, the steps in the development of the fireplace have been slow and far between. The crude devices smoked their dens, they still smoke our homes. Poet and prose writers have sung and written not of a disappointment, but of an ideal fireplace, one that is a pleasure to behold, love and appreciate; to dream before and measure every distance through the gateways of the world around, one of good cheer, that extends an wholesome welcome; are you cold, warms you; hungry, feeds you, and makes the poorest shanty as pleasant as a palace. They write not of its smoking, chilly draughts, dust and noxious gases.

Architects have designed all manner of "frozen music," much of it "ragtime" to be sure, and have spent fortunes on mantels purporting to beautify this hole in the wall, endeavoring to make the fireplace meet the poets' sentiments, all to no end—"music" and "ragtime" are smoked alike. And yet ideal fireplaces, handsome, sur-

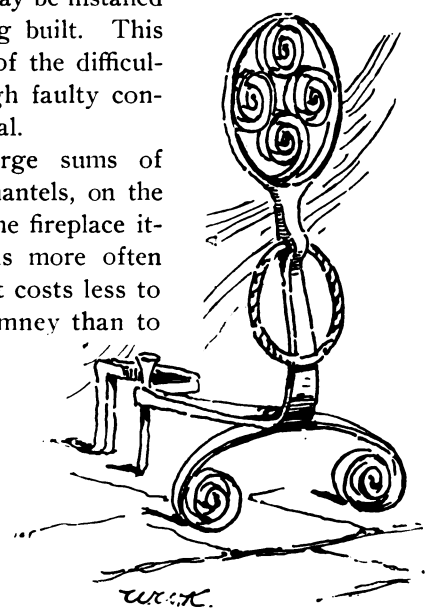
rounded with appropriate, tasteful frames and shelves, can and have been built; the poets' songs realized and revived, with all of the objectionable features eliminated.

The perfect open fire must diffuse and reflect a maximum heat from a given quantity of fuel without the escape of smoke or unhealthy gases into the room to be heated and at the same time ventilate uniformly. By experiment I have demonstrated to the fullest extent that the form, proportion, and material of a fireplace have everything to do with the successful accomplishment of these ends, and that any deviation from set rules cannot be advantageously made, and that fireplaces so built do not need draught regulating dampers or other mechanical contrivances than andirons for holding the wood, grates for coal, and gas logs for gas. With the sides or covings of the proper depth and proper angle to the back, the breast and throat of the requisite height in proportion to the width of the opening in front, very surprising results are obtained and leave nothing whatever to be desired; especially when they are made of a material which will reflect rather than retain heat. Fortunately, of late a newly manufactured



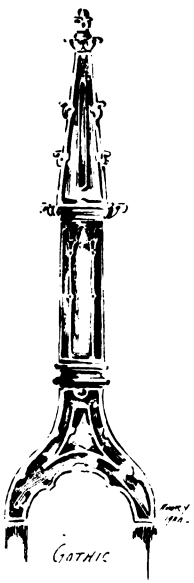
product has been put upon the market which meets all of the requirements for fireplace construction. This substance is largely composed of asbestos and is made in large slabs which can be cut and moulded into the necessary shapes, while being very hard, smooth, light in color and weight. It is fireproof in every sense of the word; a perfect insulator and will not warp or get out of shape under most severe conditions. This material now makes it possible for fireplaces, including the sloping flue connection, to be manufactured in a knocked-down condition, shipped to any destination and set up in place by an inexperienced person, and fireplaces already built can be readily altered to receive the new forms, and for new ones the forms may be installed while the chimneys are being built. This should entirely eliminate all of the difficulties now experienced through faulty construction of improper material.

As I have remarked, large sums of money have been spent on mantels, on the frame of the picture, while the fireplace itself has cost nothing, and is more often than otherwise an asset, as it costs less to leave the opening in the chimney than to



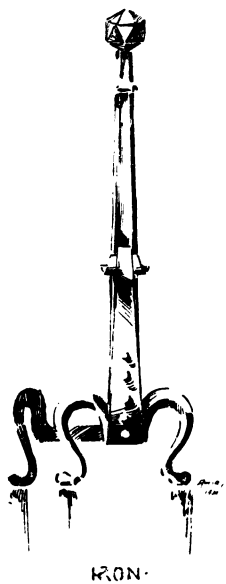
fill it with brick. I would suggest that where economy is of vital importance that less be spent on the mantel and more on the fireplace. Fireplaces built of the material above mentioned I will grant do cost more, and yet they can be manufactured and sold at so small a figure that from a viewpoint of appearance alone, and from the sincere satisfaction derived, they become an even greater asset than where the cost is nil for something which is neither sightly nor operative.

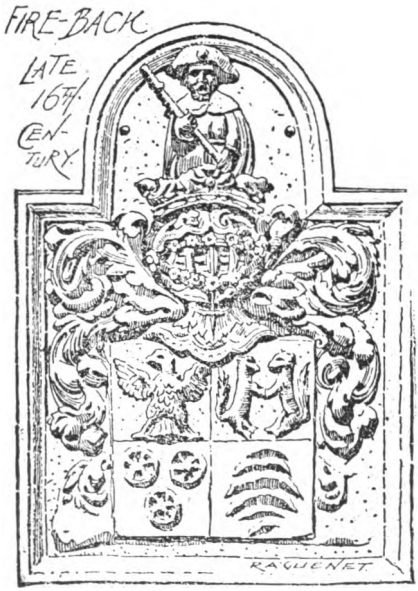
Several years ago I had occasion to build a house for James R. Steers, Esq., who was deeply interested in this subject of fireplaces and who brought to my notice a book of essays by Count of Rumford, and among them one on fireplace construction and alteration. My main object in publishing this little book is to reproduce this essay in the hope that it will be inwardly digested by the architect, the layman, and the builder, and that it will at least in a measure help to improve the condition of a very important and much neglected feature of our homes.



And while the Count's essay was written over a hundred years ago, it still holds good as I can amply testify from many practical

experiments in houses in which I have built and used fireplaces constructed on the identical lines laid down by him in his instructions. There seems to be nothing which may be judiciously cut out of his quaint descriptions, all of which should prove of infinite interest and enlightenment to those interested in the subject. Of course, that part referring to a provision for chimney sweeps will be of no service nowadays. I have had ample opportunity to test to the fullest extent a fireplace five feet wide placed in the center of the interior long side of a room 17′x28′ exposed on three sides, with eight large windows and no cellar. The house was built at Watermill, L. I., and stands on a high knoll near Mecox Bay, fully open to the most rigorous weather, and is an ordinary frame shingled house—the shingles carried down to within two inches of the ground so as to leave the underside of the floor and beams exposed to the outside temperature. In this room, with the thermometer at zero outside, we have enjoyed a temperature of seventy degrees from a small bundle of wood no larger than might be conveniently grasped in the two hands, and with larger and more wood

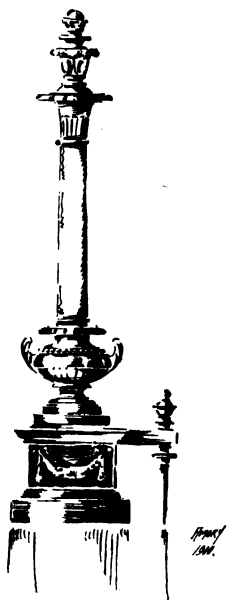



FIRE-BACK
LATE
16TH.
CEN-
TURY.
RAGUENET

the temperature at the farthest corners was readily run up to eighty degrees and the air maintained in the room pure, fresh and wholesome. The results were really surprising and far better than may be had from any other form of fireplace. This house, by the way, was provided with no other heating device than fireplaces. There are seven of them, and all quite as satisfactory as the one referred to. In my practice I will not consent to a fireplace being built otherwise. I have used and experimented with many since, and speak of this house in particular as an extraordinarily severe test.

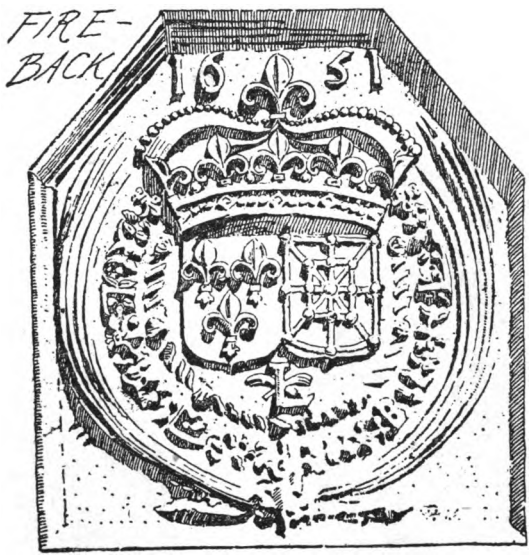
I found much difficulty in getting a mason who would follow my drawings and instructions to the letter, and as a matter of fact, in this particular house the chimneys and fireplaces had to be rebuilt three times in order to have my drawings followed exactly. All other forms, such as square jambs, improperly formed backs and coves, make the fireplaces smoke, at the same time not giving out as much heat.

Preliminary to the Count's essay I wish to portray my deductions from his able discourse with a few perspective views to give a clear conception of the proper form as



FIRE-BACK
7TH CENTURY.

FIRE-BACK.
LATE
17TH
CEN-
TURY


FIRE-
BACK
1651

finally recommended on page 156, which calls into favor the forward slope of the back and its return at the throat to the back plane of the flue, thus giving a flat shelf at this point, marked A in the several views shown on the following pages. Figure 1 is a perspective view of the front of a fireplace showing the hidden features in dotted lines. Figure 2 is a sectional view of the same, showing the plan on the floor and the internal form somewhat more clearly; and Figure 3 is an amplification of figure 2, giving a ranging view as observed from left to right, gradually opening some features as others are covered—giving a better idea of the form to the lay mind than mere plans, sections and elevations do. The internal form, while very simple in itself, does not seem to be readily grasped by the ordinary brick layer, and in building fireplaces of brick I have often been compelled to actually do it myself in order to get the proper forms in their proper places and to have them true, straight and smooth. This difficulty and the fact that while brick is only fairly useful, and iron entirely bad for the purpose, gives me reason to strongly

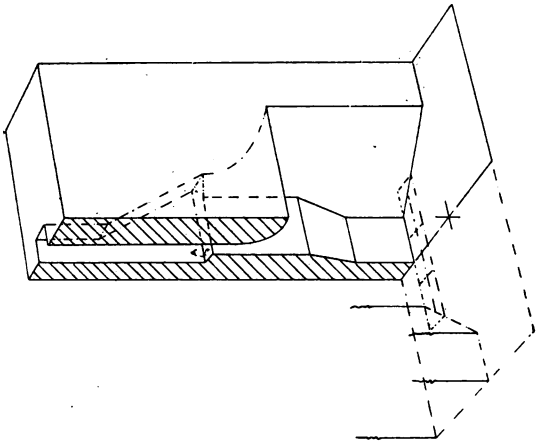


Fig. 2.

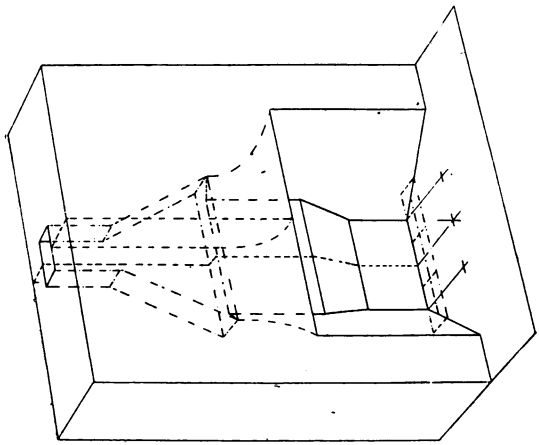


Fig. 1.

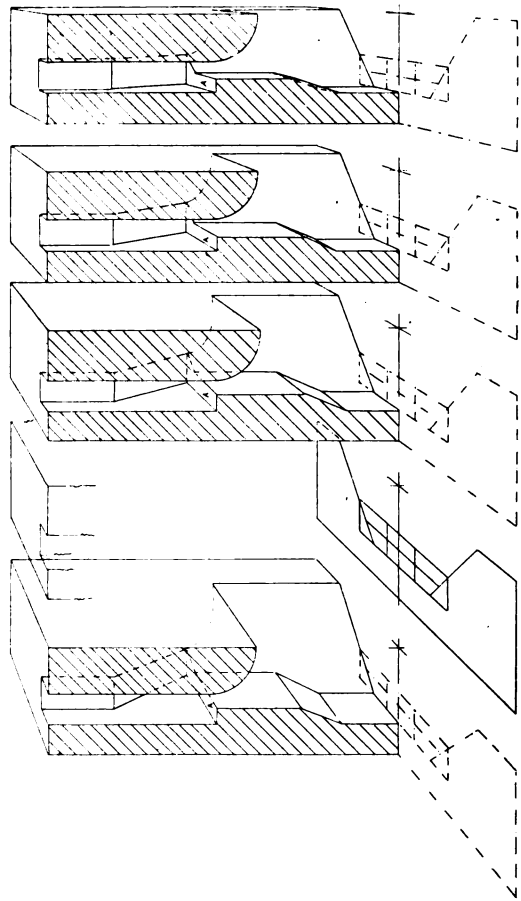


Fig. 3.

recommend fireplaces built in single slabs from the material previously mentioned. The advantages are so much superior that the difference in cost cannot well be considered.

In figures 4, 5, 6 and 7, I have given illustrations of a fireplace built up in this manner, showing clearly the method of shaping the parts to be secured together by clamps formed of the same material and bolted. The facility with which these several pieces may be assembled, set in place and backed up with brick and cement will naturally appeal to anyone at once as being the most likely and satisfactory solution of the numerous difficulties to be overcome.

Figures 8 and 9 show respectively two fireplaces having openings 5 feet and 3 feet wide. My experience convinces me that the width of the openings must determine all of the other proportions, and while these two diagrams may appear to vary somewhat from Count Rumford's descriptions, they do so only as and where he permits it. None of his diagrams show his complete theory, although the description makes the form obvious; and Fig. 10 is a

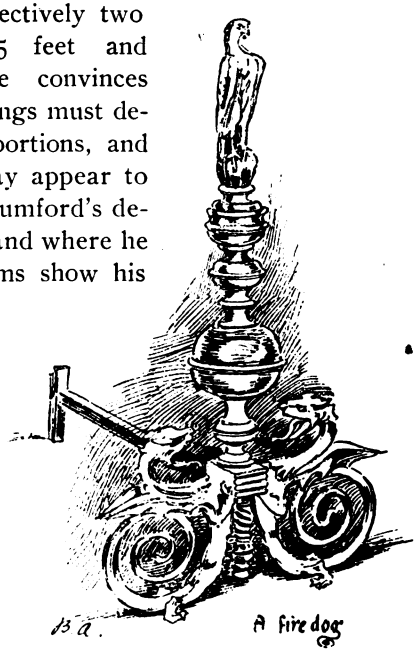


Fig. 4.

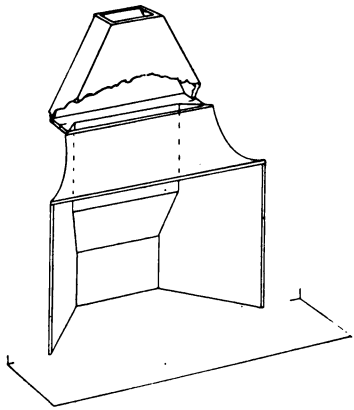
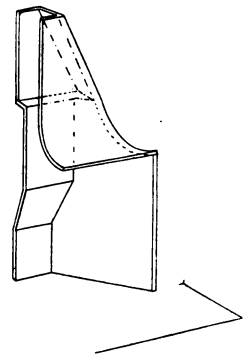
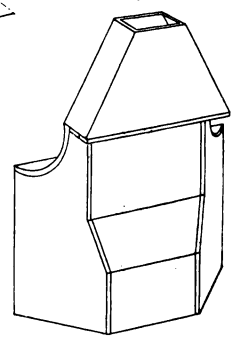


Fig. 5.





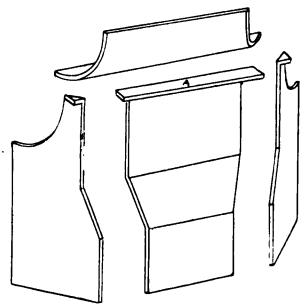
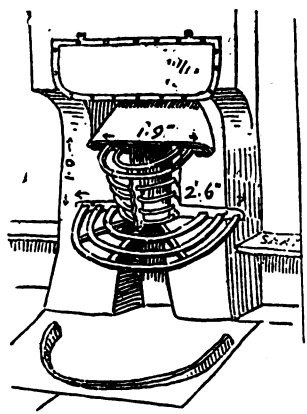


Fig. 6.

Fig. 7.

fireplace with a 3-foot wide opening laid out according to his instructions. This makes a fireplace only one foot deep, which is hardly deep enough for fires in large rooms. This, however, he provides for by increasing the thickness of the breast, as shown in Fig. 9, this being also a 3-foot opening and more commodious when it is desired to burn wood instead of coal, the former requiring more space.

I have included a portrait of Count Rumford, the father of proper fireplace construction, and the title page of his book; also throughout a number of cuts, plates and pictures which should be of interest as pertaining to the subject in hand. I wish to emphasize the fact that the Rumford fireplace here treated of is merely a thoroughly satisfactory old-fashioned fireplace which owes its benefit to its relative form, size and proportion and to nothing else.



An old Grate in the City Barge Post-House, Cheswick, Eng.

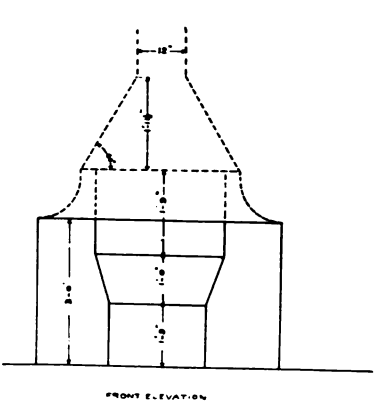

FRONT ELEVATION
SECTION
SECTION AT B-B
SECTION AT A-A
PLAN
1'-0"
1'-6"
2'-0"
1'-6"
1'-0"
7'-0"

Fig. 8.

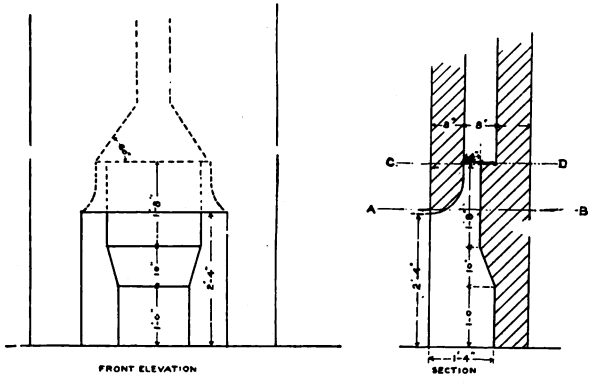
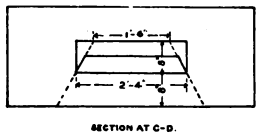

FRONT ELEVATION
SECTION
C
D
A
B

Fig. 9.


SECTION AT C-D.
SECTION AT A-B
PLAN

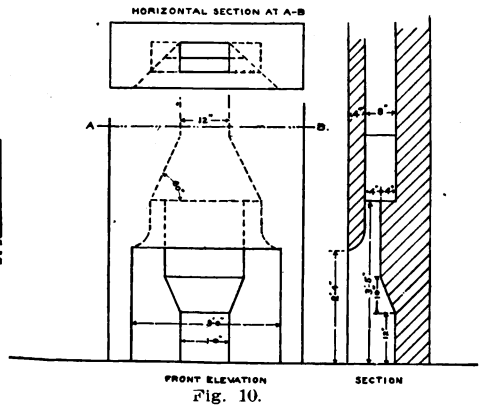
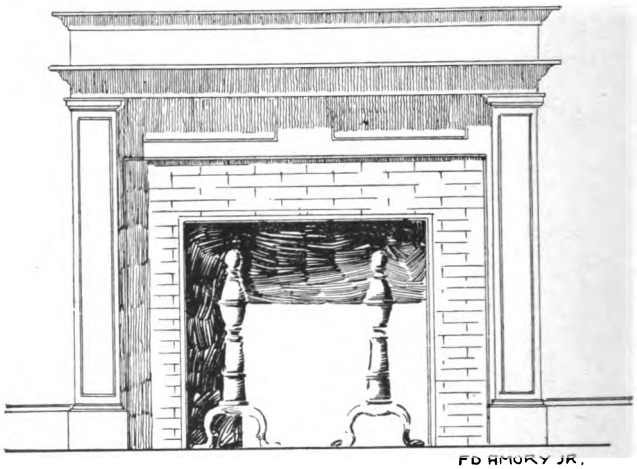
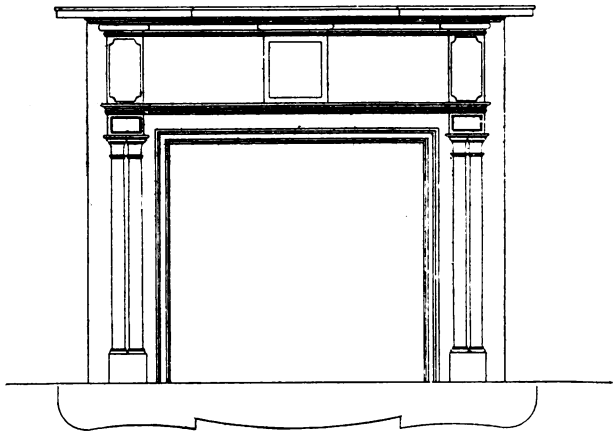

HORIZONTAL SECTION AT A-B
A
B
FRONT ELEVATION
SECTION

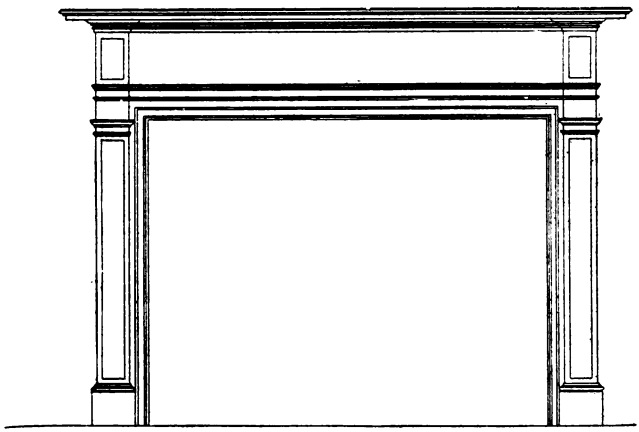
Fig. 10.



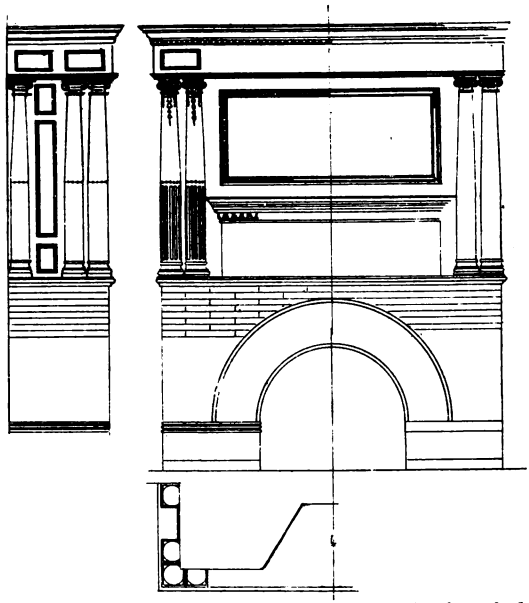
A Plain, Simple, Colonial Fireplace.



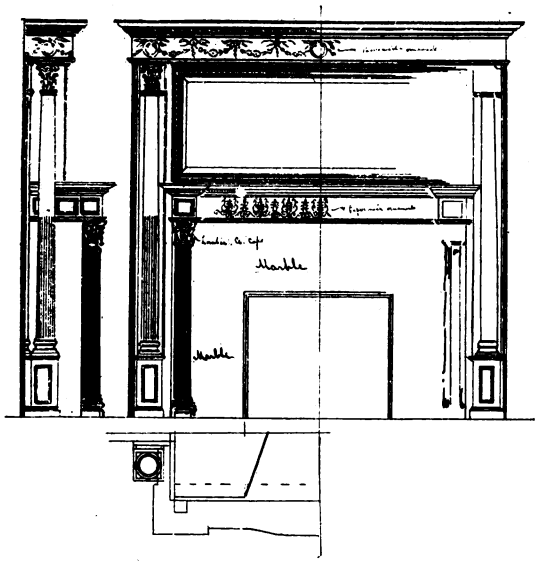
Very effective and handsome Colonial, in white.



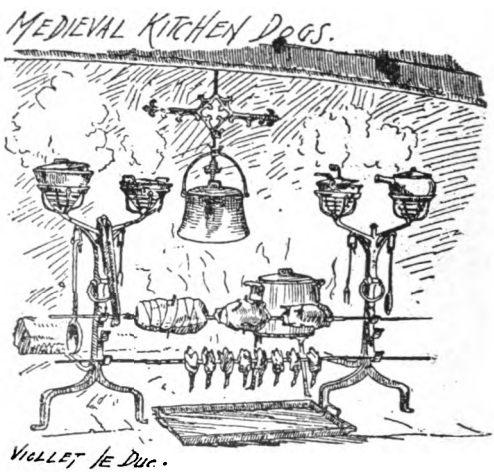
Chaste, Simple, Colonial, in black or white.

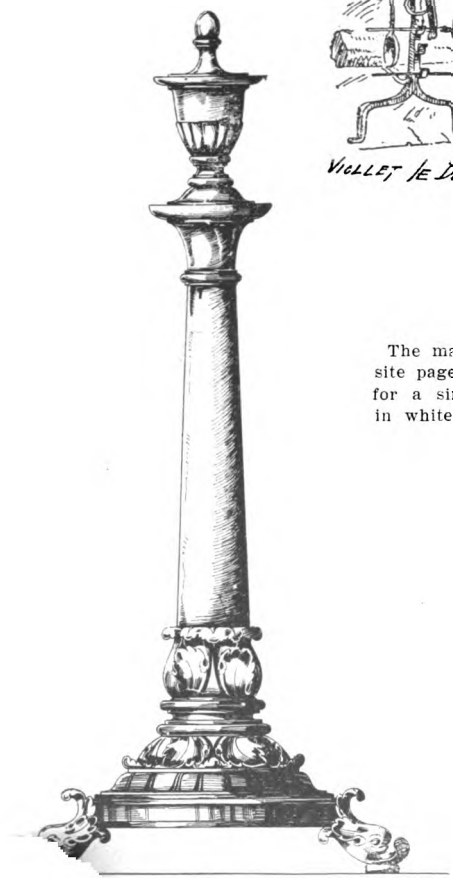


Unique modern design of wood mantel and brick arched fireplace.

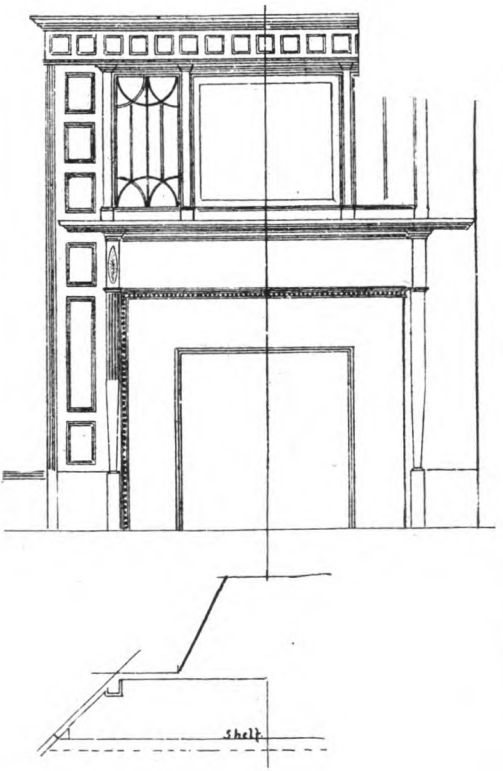


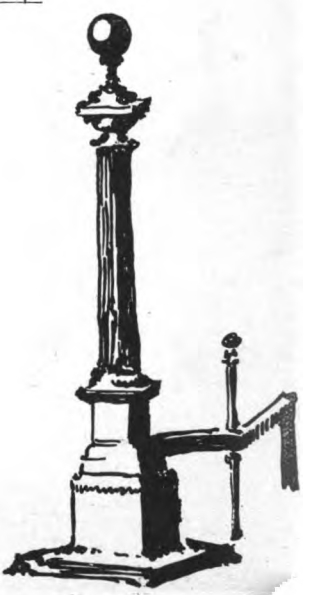
Modern mantel with marble-faced fireplace, somewhat elaborate though tasty and effective, either in natural wood or in colors.

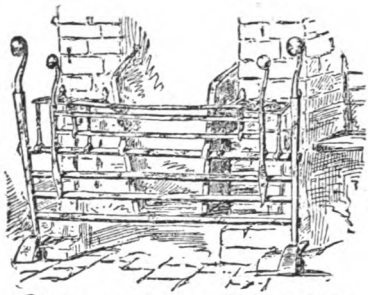




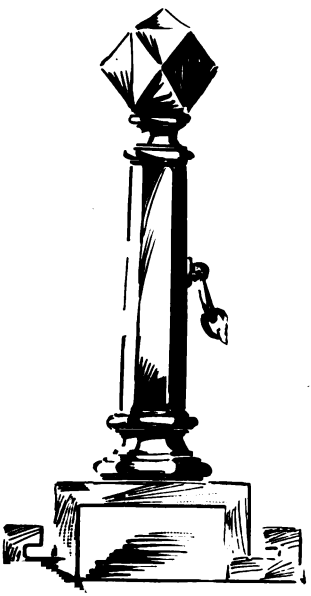
The mantel design on the opposite page shows a neat conception for a simple and practical effect in white enamel.


shelf

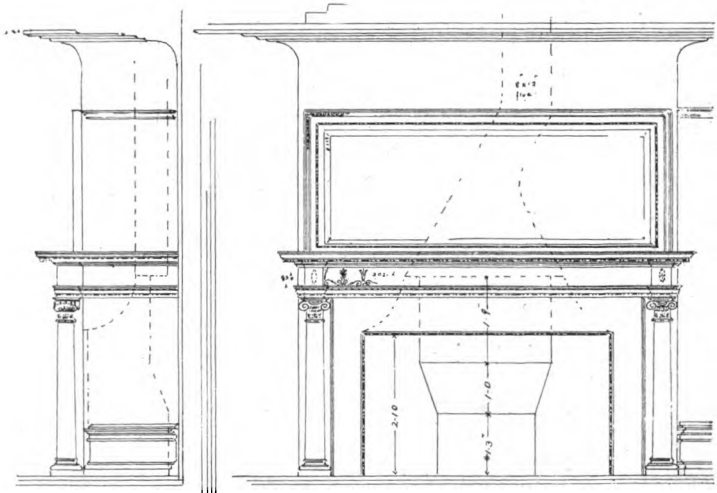


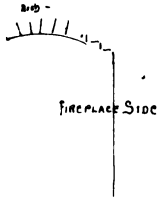


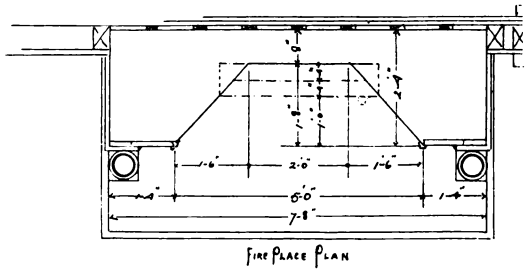
GRATE STILL IN USE AT THE WOODMAN INN, BIRMINGHAM ENG.



The mantel, shelf, mirror and columns surrounding a Rumford fireplace on opposite page is a design which I have used in several houses to very good effect where a Colonial treatment is desired.

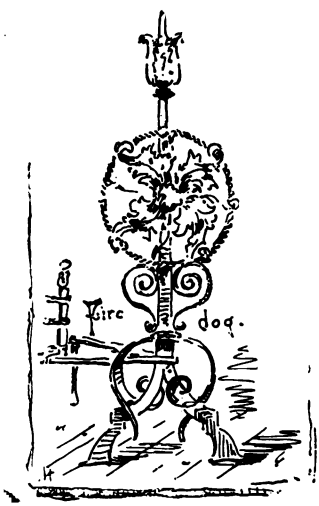

2'10
1'0
0'3
FIREPLACE ELEVATION

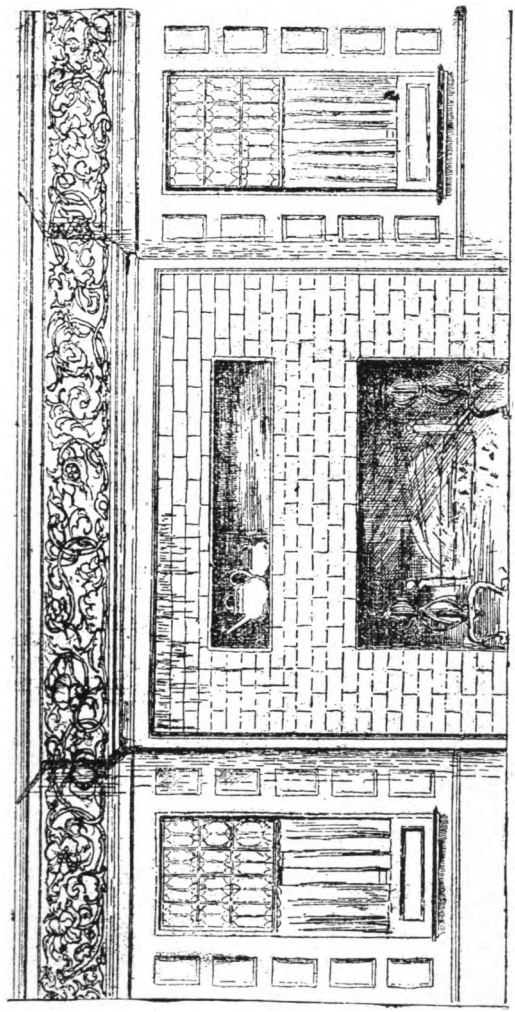

FIREPLACE SIDE


1'-6"
2'-0"
1'-6"
6'-0"
7'-8"
FIRE PLACE PLAN

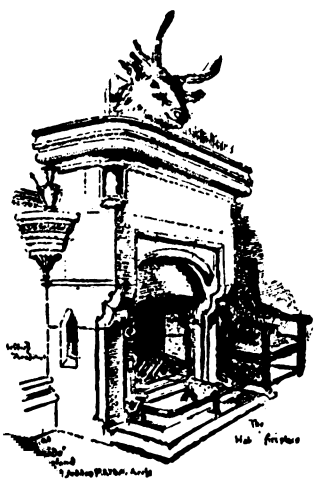
The mantel and fireplace design on page 31 shows a modern treatment in colored or enameled brick which is severely plain though quite satisfactory where such an effect is desired.

The fireplace between the windows with sunken shelf is rather unique.





The cut on the next page is illustrative of two Colonial mantels, and shows particularly the method employed by architects and designers of making working drawings and general details for the cabinet-maker to build from. Mantels are usually made and put together in the shop and shipped to the building thoroughly complete, varnished or painted ready to put in place, but usually do not comprise any particular facing for the fireplace, this being left for selection according to the general color effect of the room where the mantel is to go.



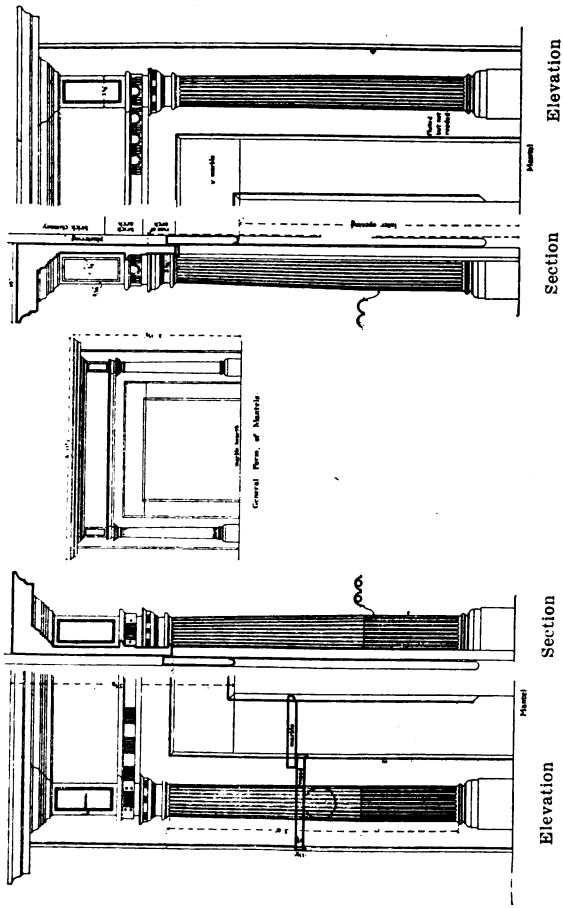
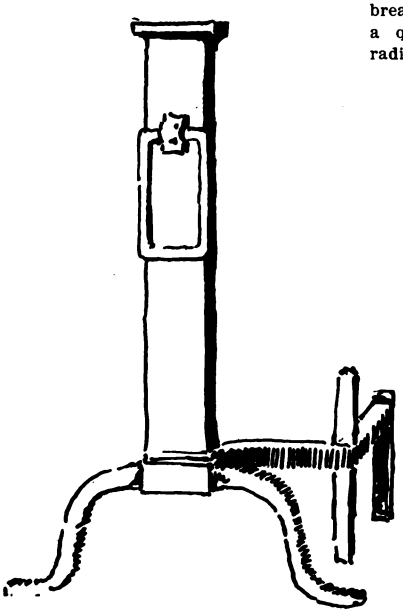
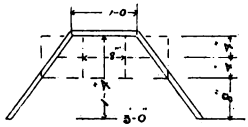
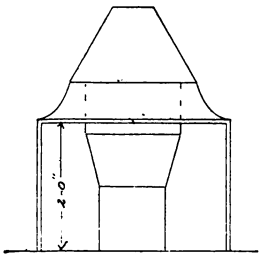

Elevation
Section
Section
Elevation

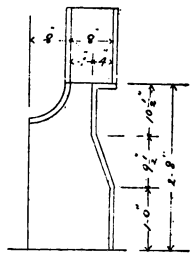
Figure 11, on the following page, shows two fireplaces designed to be built of fireproof slabs, secured and joined together ready for installation, strictly according to the dimensions and proportions as laid down by Count Rumford. One is for an opening three feet wide and the other for one three feet six inches. Attention is called to the particular angle of the sides, the narrowness of the back, and the depth, also the high and smooth roundness of what the Count calls the breast; in these two cases this is a quarter circle of eight inches radius.







3-0" x 8" Breast



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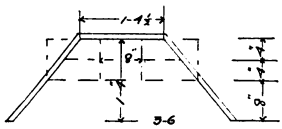
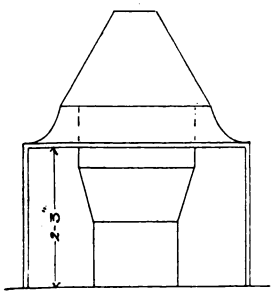
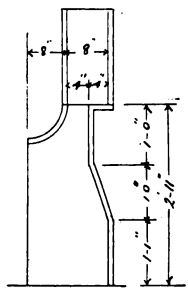




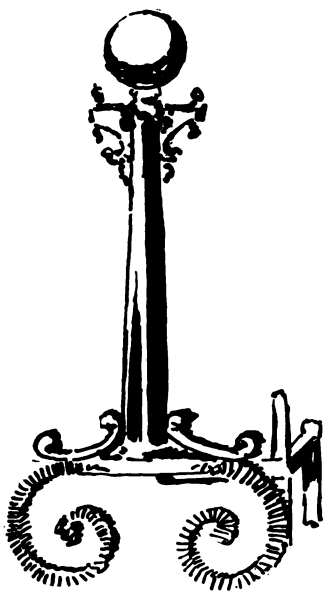
3-6" x 8" Breast

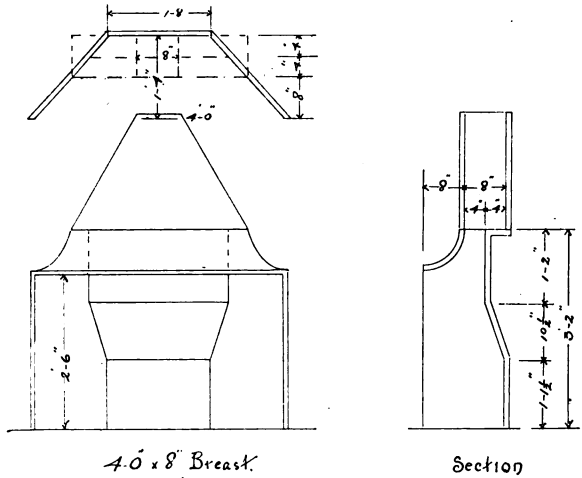


Section

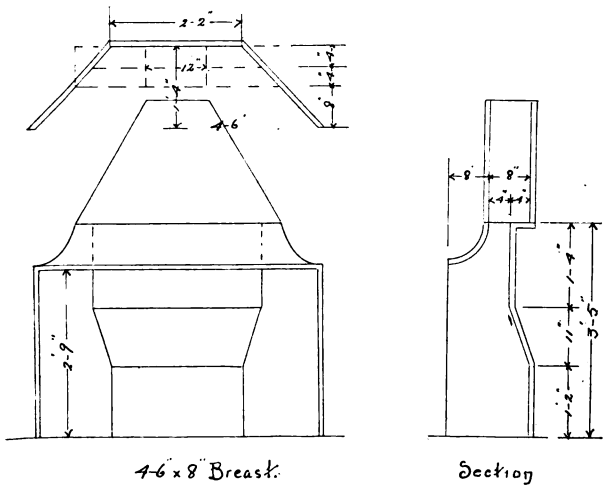
Fig. 11.

Figure 12 on the opposite page shows also two slab fireplaces similar to Figure 11, having openings respectively four and four feet six inches wide. Attention is called to the fact that the breasts are no deeper and have the same radius. However, the backs are somewhat wider while the depths remain the same, thus throwing the heat as far into the room as possible without permitting the escape of smoke or gas into it. The entire fireplace is only 16 inches deep.





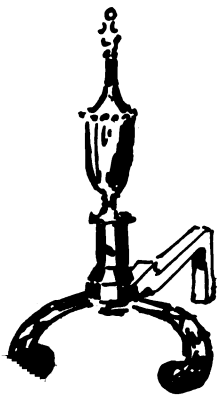
4-0 x 8" Breast. Section

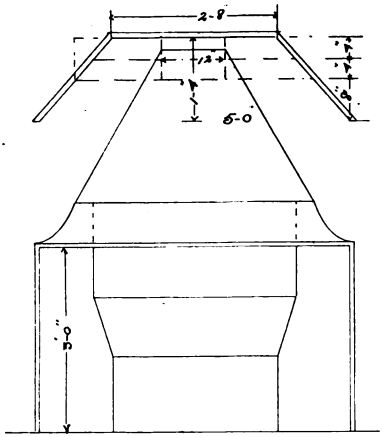


4-6 x 8" Breast. Section

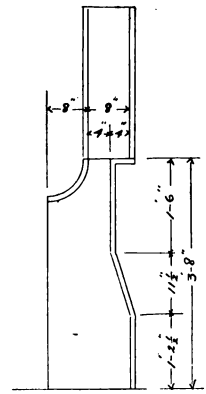
Fig. 12.

Figure 13 shows Count Rumford's proportions for two five-foot fireplaces, one having an eight-inch breast and one a twelve-inch breast. The latter is twenty inches deep instead of sixteen, and is preferable where large logs of wood are to be burned in fairly large rooms or halls. Attention is called to the fact that in the deeper fireplace the back is considerably narrower, caused by the retaining of a proportionate angle between the sides and the back.





5-0 x 8 Breast.



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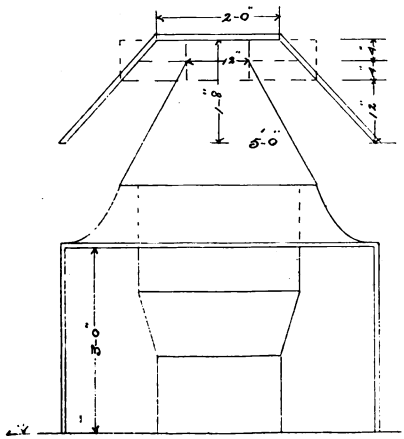
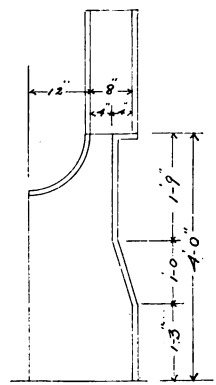
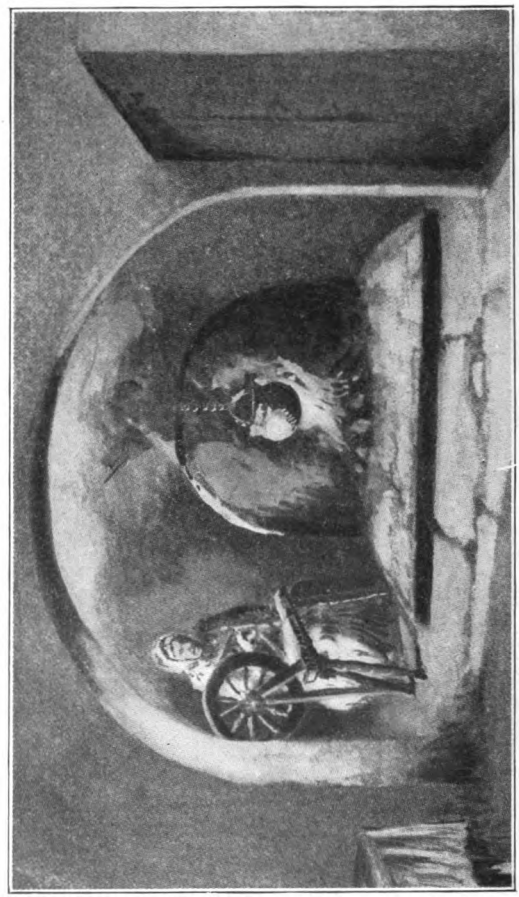


5-0 x 12" Breast.

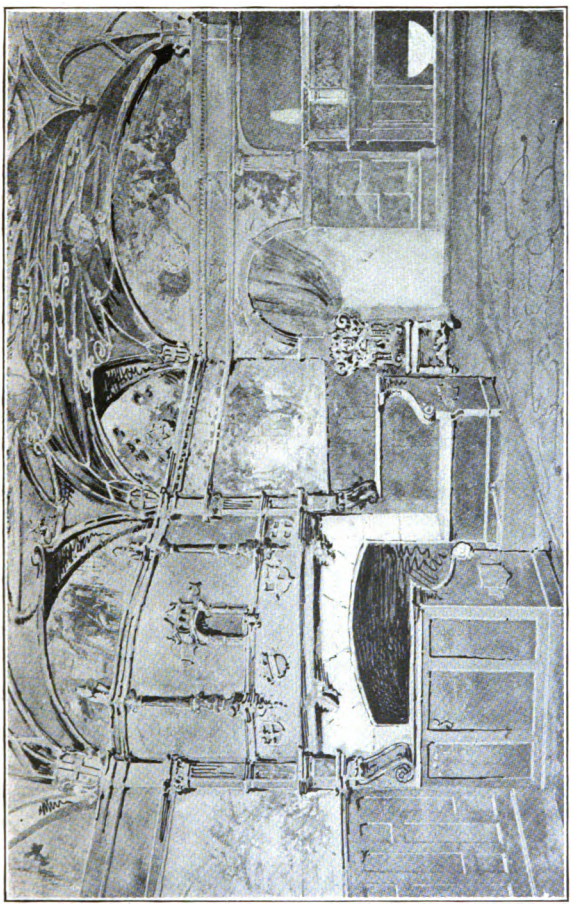


Section

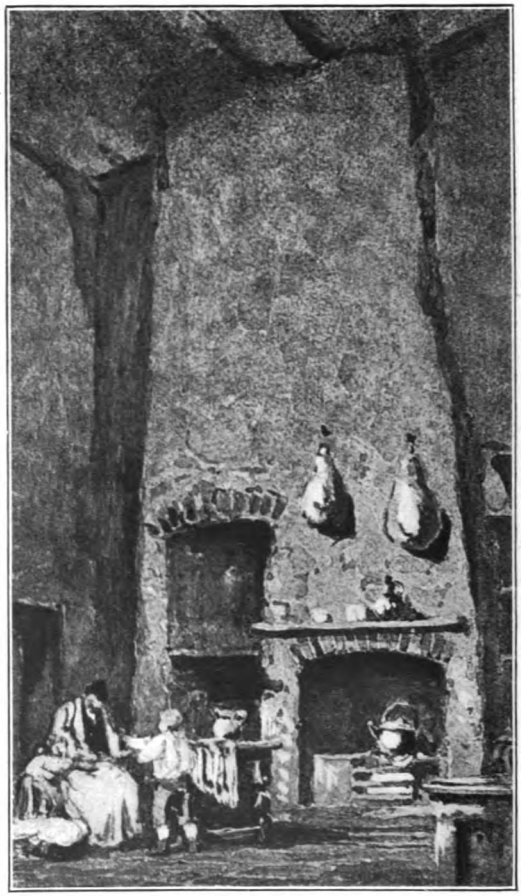
Fig. 13.



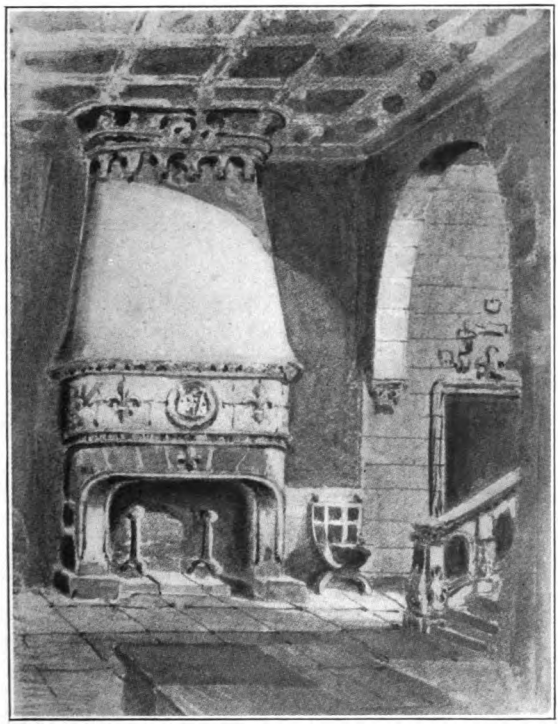
A Primitive Hearth.



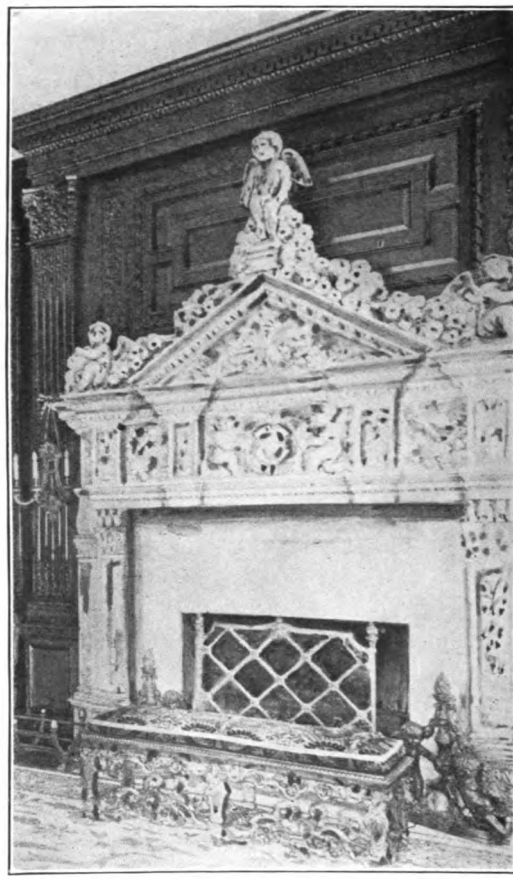
An English Fireplace and Interior, XVI Century.



Astroells, Northamptonshire.



Norman.



Modern Renaissance.

Benjamin, Count of Rumford.

ESSAYS,

POLITICAL, ECONOMICAL,

AND

PHILOSOPHICAL.

By BENJAMIN Count of RUMFORD,

KNIGHT OF THE ORDERS OF THE WHITE EAGLE, AND ST. STANISLAUS

Chamberlain, Privy Counſellor of State, and Lieutenant-General in the Service of his Moſt Serene Highneſs the ELECTOR PALATINE, *Reigning* DUKE *of* BAVARIA; *Colonel of his Regiment of Artillery, and Commander in Chief of the General Staff of his Army;* F. R. S. Acad. R. Hiber. Berol. Elec. Bonon. Palat. et Amer Soc.

The Firſt American,
From the Third London, Edition.

VOL. I.

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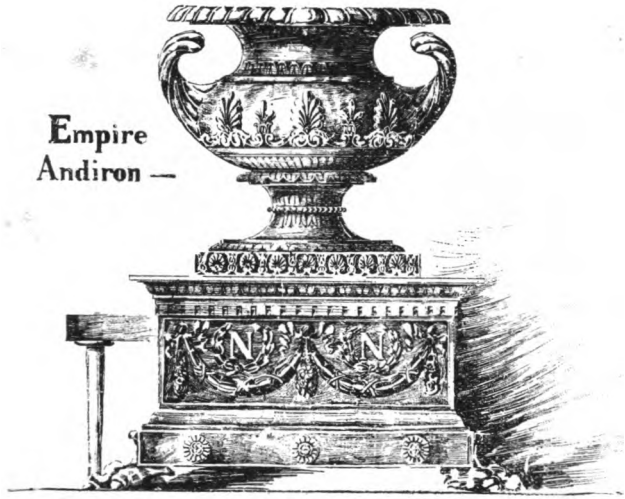
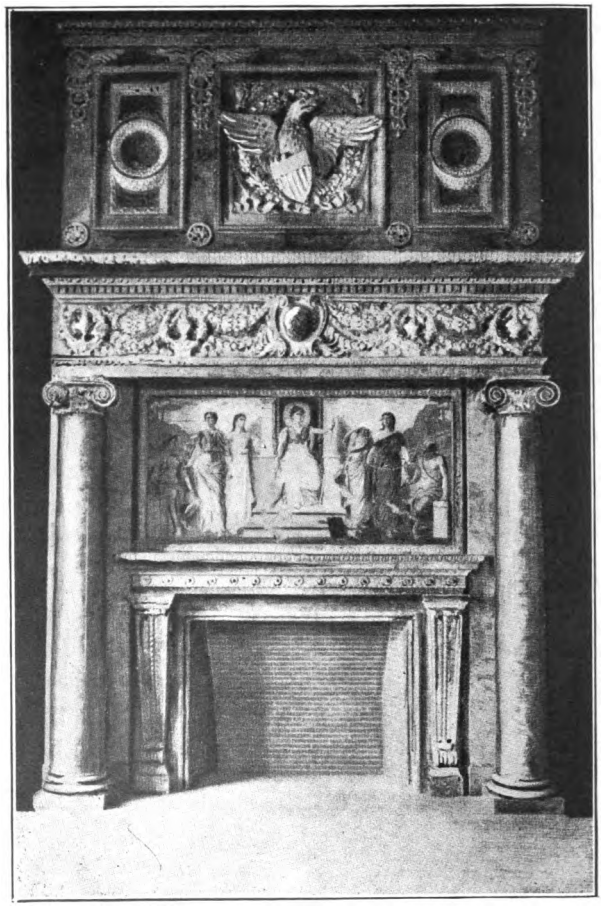
MARCH, 1798.



CHAPTER I.

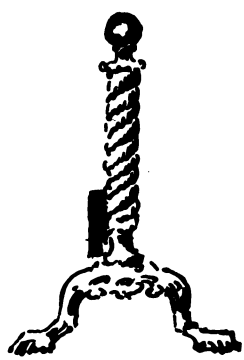
"The plague of a smoking Chimney is proverbial; but there are many other very great defects in open Fire-places, as they are now commonly constructed in this country, and indeed throughout Europe, which, being less obvious, are seldom attended to; and there are some of them very fatal in their consequences to health; and, I am persuaded, cost the lives of thousands every year in this island.

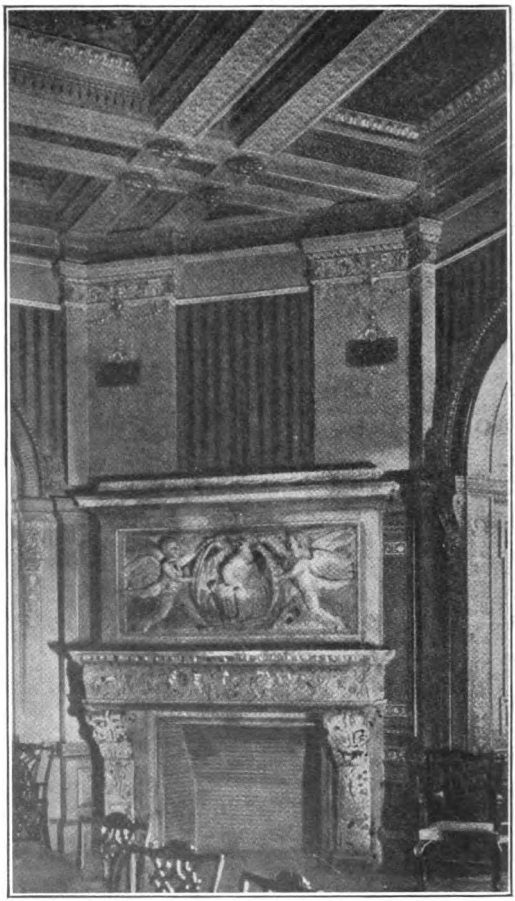


Fireplace in the House Reading Room, Library of Congress.

Those cold and chilling draughts of air on one side of the body, while the other side is scorched by a Chimney Fire, which every one who reads this must often have felt, cannot but be highly detrimental to health; and in weak and delicate constitutions must often produce the most fatal effects.—I have no doubt in my mind that thousands die in this country every year of consumption, occasioned solely by this cause.—By a cause which might be so easily removed!—By a cause whose removal would tend to promote comfort and convenience in so many ways.

Strongly impressed as my mind is with the importance of this subject, it is not possible for me to remain silent.—The subject is too nearly connected with many of the most essential enjoyments of life not to be highly interesting to all those who feel pleasure in promoting, or in contemplating the comfort and happiness of mankind.—And without suffering myself to be deterred, either by the fear of being thought to give to the subject a degree of importance to which it is not entitled, or by the apprehension of being tiresome to my readers by the prolixity of my descriptions,





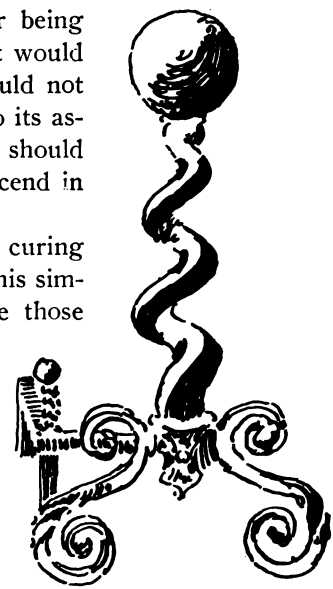
Fireplace in the Senate Reading Room, Library of Congress.

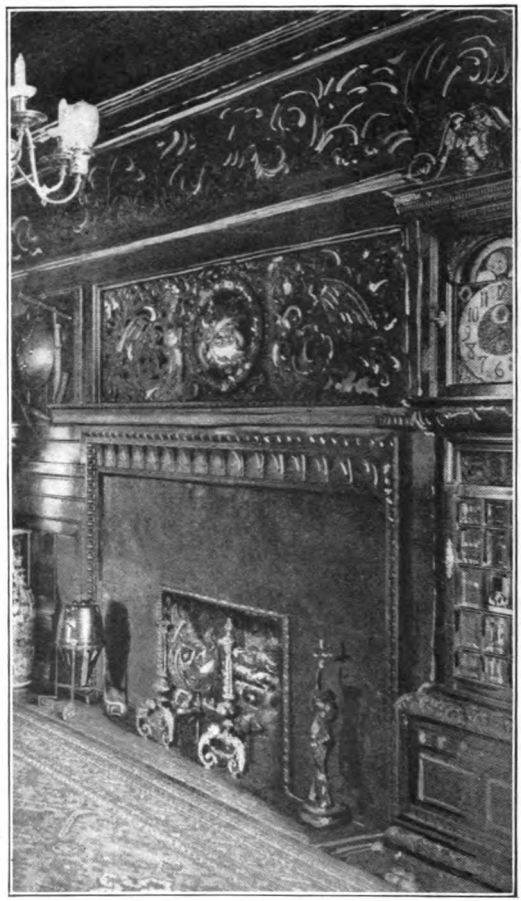
I shall proceed to investigate the subject in all its parts and details with the utmost care and attention, and first with regard to smoking Chimnies:

There are various causes by which Chimnies may be prevented from carrying smoke; but there are none that may not easily be discovered and completely removed.—This will doubtless be considered as a bold assertion; but I trust I shall be able to make it appear in a manner perfectly satisfactory to my readers, that I have not ventured to give this opinion but upon good and sufficient grounds.

Those who will take the trouble to consider the nature and properties of elastic fluids,—of air,—smoke,—and vapour,—and to examine the laws of their motions, and the necessary consequences of their being rarified by heat, will perceive that it would be as much a miracle if smoke should not rise in a Chimney, (all hindrances to its ascent being removed) as that water should refuse to run in a syphon, or to descend in a river.

The whole mystery, therefore, of curing smoking Chimnies, is comprised in this simple direction,—find out and remove those





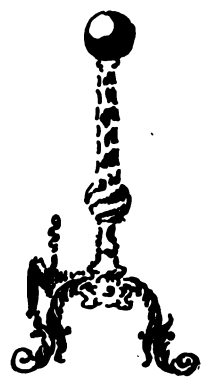
Hall Fireplace for Mr. Sumner McKnight.
Minneapolis, Minn. Bertrand & Keith, Architects.

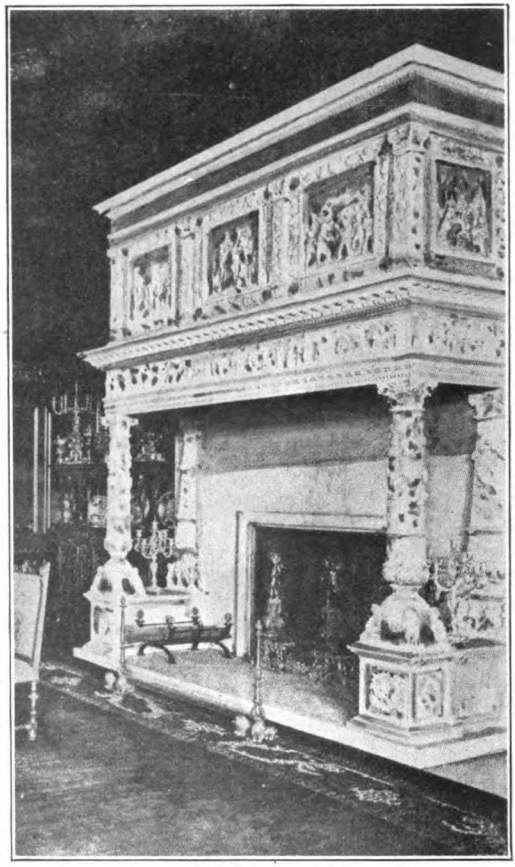
local hindrances which forcibly prevent the smoke from following its natural tendency to go up the Chimney; or rather, to speak more accurately, which prevents its being forced up the Chimney by the pressure of the heavier air of the room.

Although the causes, by which the ascent of smoke in a Chimney may be obstructed, are various, yet that cause which will most commonly, and I may say almost universally be found to operate, is one which it is always very easy to discover, and as easy to remove,—the bad construction of the Chimney in the neighborhood of the Fire-place.

In the course of all of my experience and practice in curing smoking Chimnies,—and I certainly have not had less than five hundred under my hands, and among them many which were thought to be quite incurable,—I have never been obliged, except in one single instance, to have recourse to any other method of cure than merely reducing the Fire-place and the throat of the Chimney, or that part of it which lies immediately above the Fire-place, to a proper form, and just dimensions.

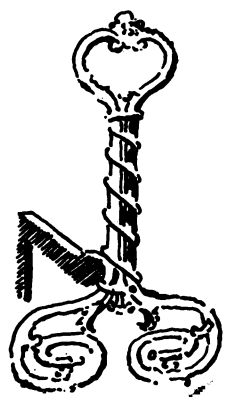
That my principles for constructing Fire-

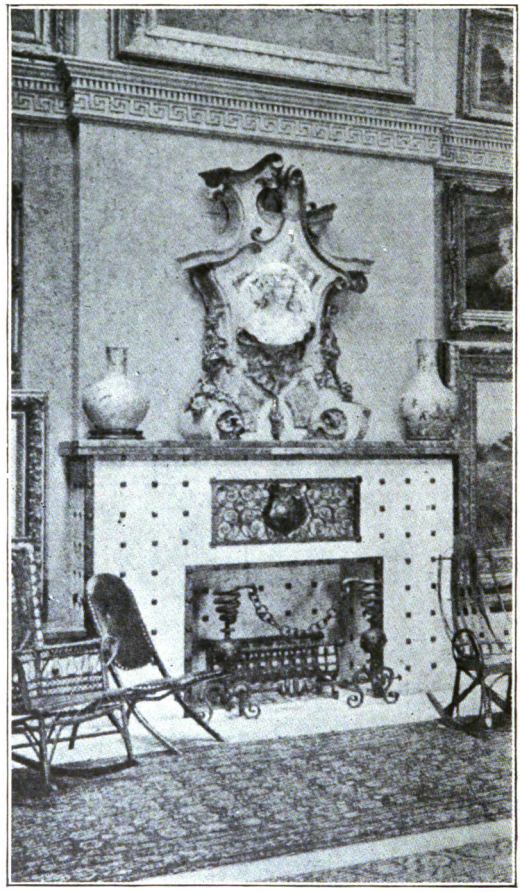




Dining-room Fireplace, Mr. Richard Mortimer.
Tuxedo, N. Y. Hunt & Hunt, Architects.

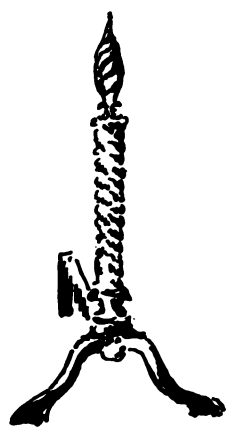
places are equally applicable to those which are designed for burning coal, as to those in which wood is burnt, has lately been abundantly proved by experiments made here in London; for of above a hundred and fifty Fire-places which have been altered in this city, under my direction, within these last two months, there is not one which has not answered perfectly well.—And by several experiments which have been made with great care, and with the assistance of thermometers, it has been demonstrated, that the saving of fuel, arising from these improvements of Fire-places, amounts in all cases to more than half, and in many cases to more than two-thirds of the quantity formerly consumed.—Now as to the necessary alterations in Fire-places, which may be made at a very trifling expense, any kind of grate may be made use of, and as no iron work, but merely a few bricks and some mortar, or a few small pieces of fire-stone, are required; the improvement in question is very important, when considered merely with a view to economy; but it should be remembered, that not only a great saving is made of fuel by the alterations proposed, but that rooms

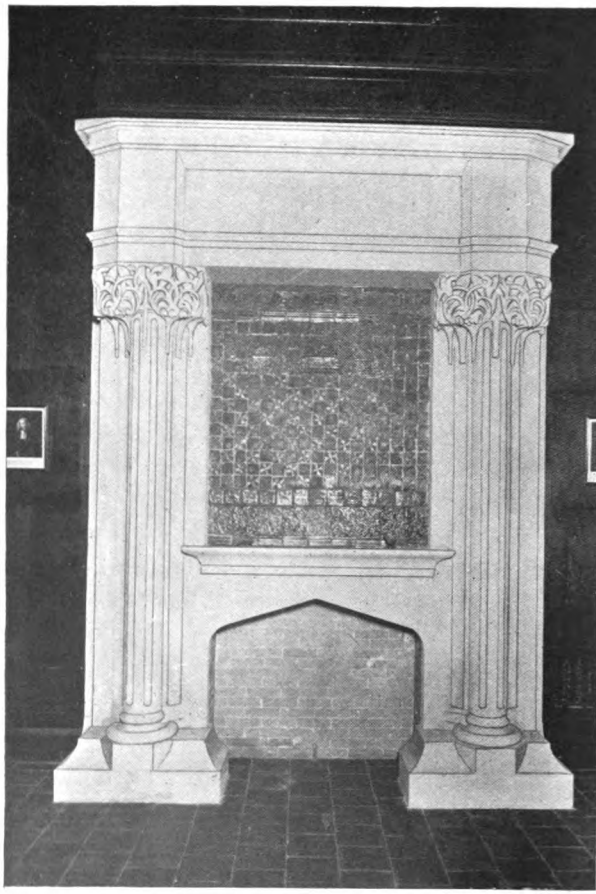




Fireplace in Belle Vista Castle.

are made much more comfortable, and more salubrious;—that they may be more equally warmed, and more easily kept at any required temperature;—that all draughts of cold air from the doors and windows towards the Fire-place, which are so fatal to delicate constitutions, will be completely prevented;—that in consequence of the air being equally warm all over the room, or in all parts of it, it may be entirely changed with the greatest facility, and the room completely ventilated, when this air is become unfit for respiration, and this merely by throwing open for a moment a door opening into some passage from whence fresh air may be had, and the upper part of a window; or by opening the upper part of one window and the lower part of another. And as the operation of ventilating the room, even when it is done in the most complete manner, will never require the door and window to be open more than one minute; in this short time the walls of the room will not be sensibly cooled, and the fresh air which comes into the room will, in a very few minutes, be partially warmed by these walls, so that the temperature of the room, though the air in it be



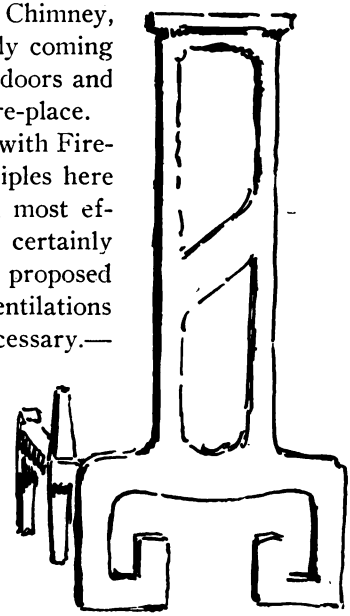


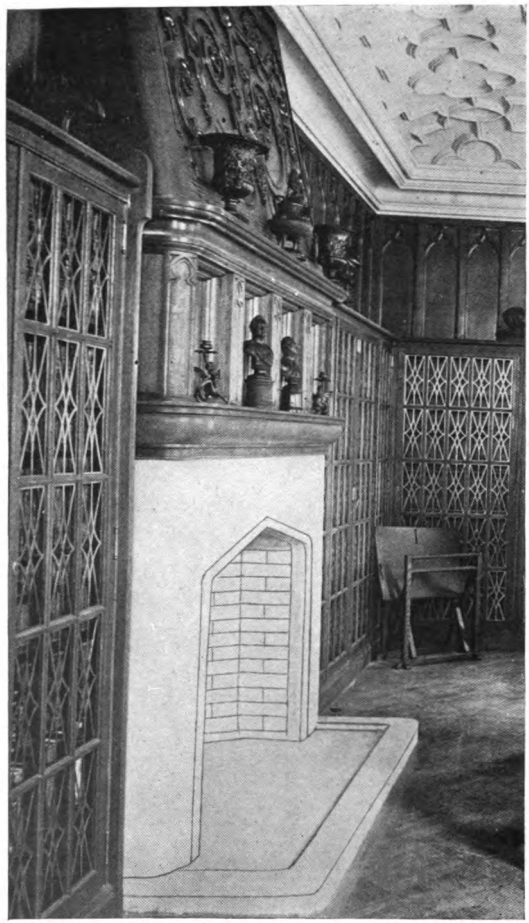
Fireplace in the Residence of Phillip S. Henry, Esq.,
New York City.
Herts & Tallant, Architects.

perfectly changed, will be brought to be very nearly the same as it was before the ventilation.

Those who are acquainted with the principles of pneumatics, and know why the warm air in a room rushes out at an opening made for it at the top of a window when colder air from without is permitted to enter by the door, or by any other opening situated lower than the first, will see, that it would be quite impossible to ventilate a room in the complete and expeditious manner here described, where the air in a room is partially warmed, or hardly warmed at all, and where the walls of the room, remote from the fire, are constantly cold; which must always be the case where, in consequence of a strong current up the Chimney, streams of cold air are continually coming in through all the crevices of the doors and windows, and flowing into the Fire-place.

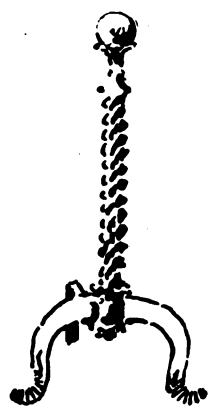
But although rooms, furnished with Fire-places constructed upon the principles here recommended, may be easily and most effectually ventilated, (and this is certainly a circumstance in favour of the proposed improvements) yet such total ventilations will very seldom, if ever, be necessary.—

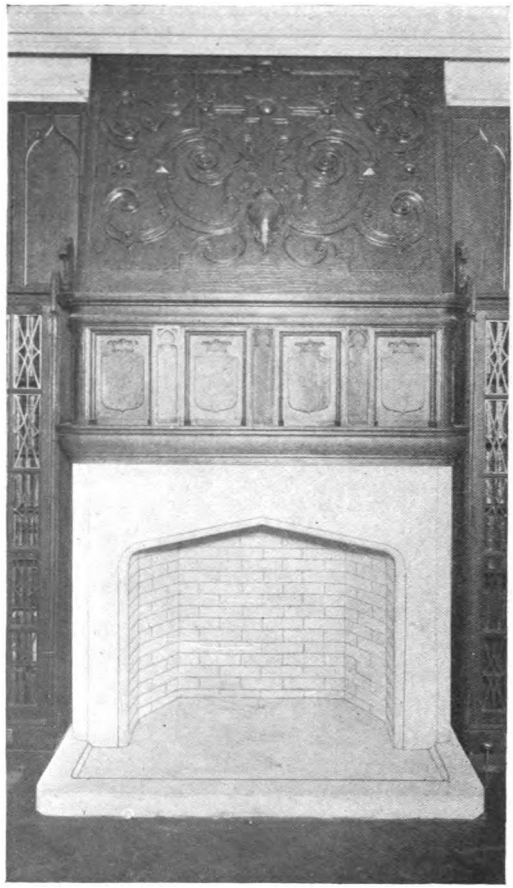




Oak Mantel over Fireplace in Library of Phillip S. Henry Residence.
Herts & Tallant, Architects.

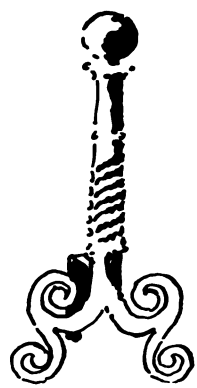
As long as any fire is kept up in a room, there is so considerable a current of air up the Chimney, notwithstanding all the reduction that can be made in the size of its throat, that the continual change of air in the room which this current occasions will, generally, be found to be quite sufficient for keeping the air in the room sweet and wholesome; and indeed in rooms in which there is no open Fire-place, and consequently no current of air from the room setting up the Chimney, which is the case in Germany, and all the northern parts of Europe, where rooms are heated by stoves, whose Fire-places, opening without, are not supplied with the air, necessary for the combustion of the fuel, from the room;—and although in most of the rooms abroad, which are so heated, the windows and doors are double, and both are closed in the most exact manner possible, by slips of paper pasted over the crevices, or by slips of list or fur; yet when these rooms are tolerably large, and when they are not very much crowded by company, nor filled with a great many burning lamps or candles, the air in them is seldom so much injured as to become oppressive or unwholesome; and

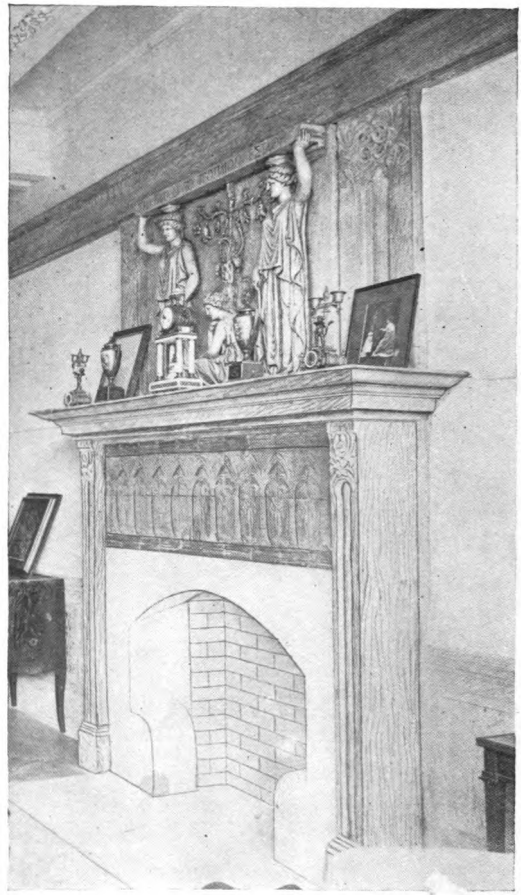




Another View of the Library Fireplace in the Phillip S. Henry Residence.
Herts & Tallant, Architects.

those who inhabit them show by their ruddy countenances, as well as by every other sign of perfect health, that they suffer no inconvenience whatever from their closeness.—There is frequently, it is true, an oppressiveness in the air of a room heated by a German stove, of which those who are not much accustomed to living in those rooms seldom fail to complain, and indeed with much reason; but this oppressiveness does not arise from the air of the room being injured by the respiration and perspiration of those who inhabit it—it arises from a very different cause: from a fault in the construction of German stoves in general, but which may be easily and most completely remedied, as I shall show more fully in another place. In the mean time, I would just observe here with regard to these stoves, that as they are often made of iron, and as this metal is a very good conductor of heat, some part of the stove in contact with the air of the room becomes so hot as to calcine or rather to roast the dust which lights upon it; which never can fail to produce a very disagreeable effect on the air of the room. And even when the stove is constructed of pantiles or pottery-



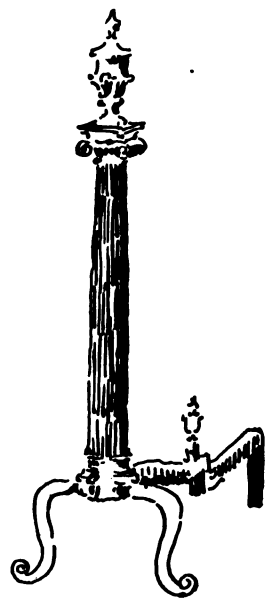


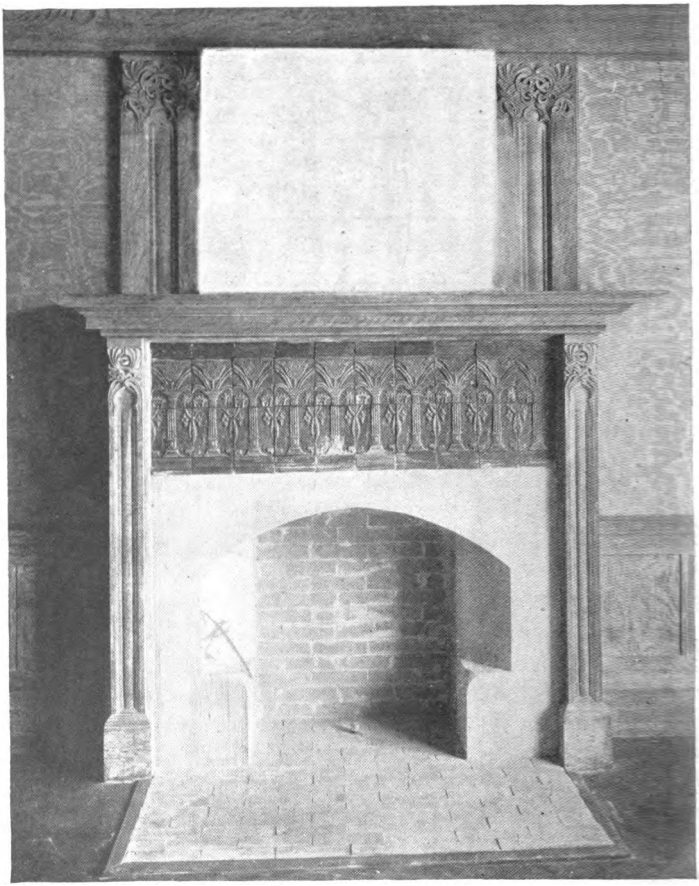
Reception Room Fireplace in the Phillip S. Henry Residence.
Herts & Tallant, Architects.

ware, if any part of it in contact with the air of the room is suffered to become very hot, which seldom fails to be the case in German stoves constructed on the common principles, nearly the same effects will be found to be produced on the air as when the stove is made of iron, as I have very frequently had occasion to observe.

Though a room be closed in the most perfect manner possible, yet, as the quantity of air injured and rendered unfit for further use by the respiration of two or three persons in a few hours is very small, compared to the immense volume of air which a room of moderate size contains; and as a large quantity of fresh air always enters the room, and an equal quantity of the warm air of the room is driven out of it every time the door is opened, there is much less danger of the air of a room becoming unwholesome for the want of ventilation than has been generally imagined; particularly in cold weather, when all the different causes which conspire to change the air of warmed rooms act with increased power and effect.

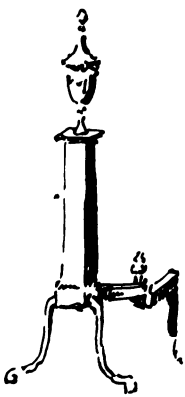
Those who have any doubts respecting the very great change of air or ventilation which takes place each time the door of a





The Reception Room Fireplace before the Mantel Panel was Set.
Herts & Tallant, Architects.

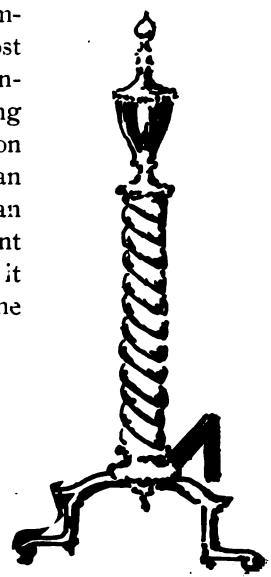
warm room is opened in cold weather, need only set the door of such a room wide open for a moment, and hold two lighted candles in the door-way, one near the top of the door, and the other near the bottom of it; the violence with which the flame of that above will be driven outwards, and that below inwards, by the two strong currents of air which, passing in opposite directions, rush in and out of the room at the same time, will be convinced that the change of air which actually takes place must be very considerable indeed; and these currents will be stronger, and consequently the change of air greater, in proportion as the difference is greater between the temperatures of the air within the room and of that without. I have been more particular upon this subject,—the ventilation of warmed rooms which are constantly inhabited,—as I know the people in general in this country have great apprehensions of the bad consequences to health of living in rooms, in which there is not a continual influx of cold air from without. I am as much an advocate for a free circulation of air as any body, and always sleep in a bed without curtains on that account; but I am much



Modern Fireplace, New York City.

inclined to think, that the currents of cold air which never fail to be produced in rooms heated by Fire-places constructed upon the common principle,—those partial heats on one side of the body, and cold blasts on the other, so often felt in houses in this country, are infinitely more detrimental to health than the supposed closeness of the air in a room warmed more equally, and by a smaller fire.

All these advantages, attending the introduction of the improvements in Fire-places here recommended, are certainly important, and I do not know that they are counterbalanced by any one disadvantage whatsoever. The only complaint that I have ever heard made against them was, that they made the rooms too warm; but the remedy to this evil is so perfectly simple and obvious, that I should be almost afraid to mention it, lest it might be considered as an insult to the understanding of the person to whom such information should be given; for nothing surely can be conceived more perfectly ridiculous than the embarrassment of a person on account of the too great heat of his room, when it is in his power to diminish at pleasure the

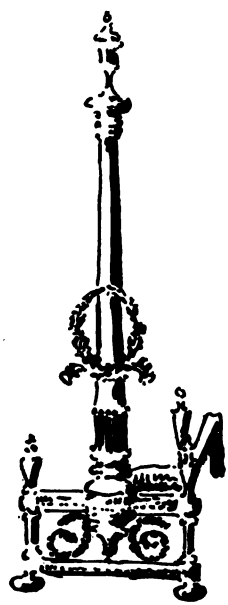


Empire.

fire by which it is warmed; and yet, strange as it may appear, this has sometimes happened!

Before I proceed to give directions for the construction of Fire-places, it will be proper to examine more carefully the Fire-places now in common use;—to point out their faults;—and to establish the principles upon which Fire-places ought to be constructed.

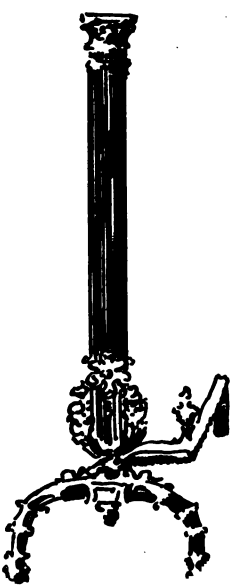
The great fault of all the open Fire-places, or Chimnies, for burning wood or coals in an open fire, now in common use, is, that they are much too large; or rather it is the throat of the Chimney, or the lower part of its open canal, in the neighborhood of the mantle, and immediately over the fire, which is too large. This opening has hitherto been left larger than it otherwise probably would have been made, in order to give a passage to the Chimney-sweeper; but I shall show hereafter how a passage for the Chimney-sweeper may be contrived without leaving the throat of the Chimney of such enormous dimensions as to swallow up and devour all the warm air of the room, instead of merely giving a passage to the smoke and heated vapour which rise from

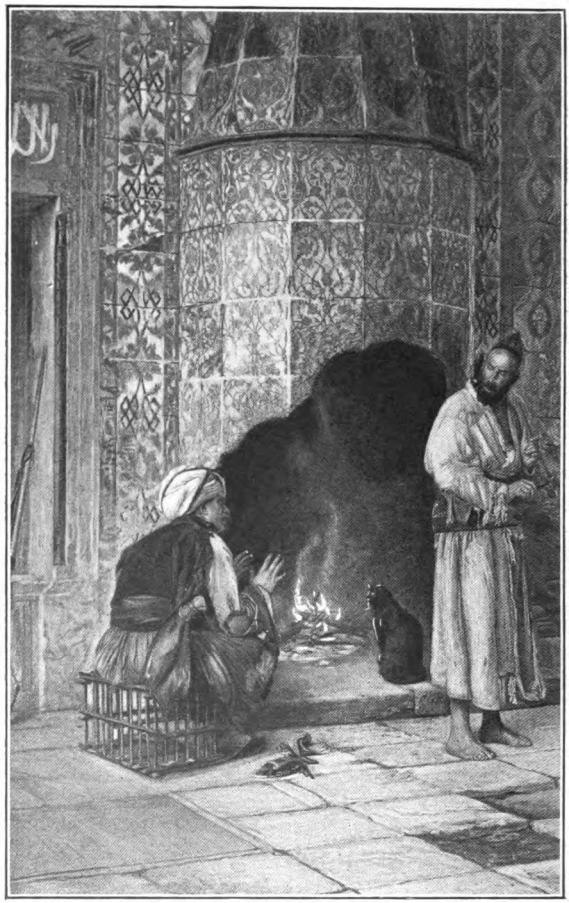


A Cosy Corner.

the fire, for which last purpose alone it ought to be destined.

Were it my intention to treat my subject in a formal scientific manner, it would doubtless be proper, and even necessary, to begin by explaining in the fullest manner, and upon the principles founded on the laws of nature, relative to the motions of elastic fluids, as far as they have been discovered and demonstrated, the causes of the ascent of smoke; and also to explain and illustrate upon the same principles, and even to measure, or estimate by calculations, the precise effects of all those mechanical aids which may be proposed for assisting it in its ascent, or rather for removing those obstacles which hinder its motion upwards;—but as it is my wish rather to write an useful practical treatise, than a learned dissertation, being more desirous to contribute in diffusing useful knowledge, by which the comforts and enjoyments of mankind may be increased, than to acquire the reputation of a philosopher among learned men, I shall endeavor to write in such a manner as to be easily understood by those who are most likely to profit by the information I have to communicate, and con-

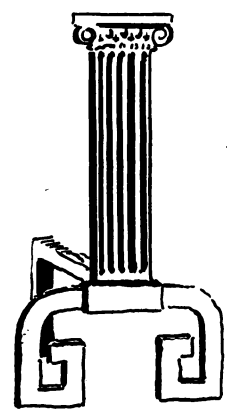


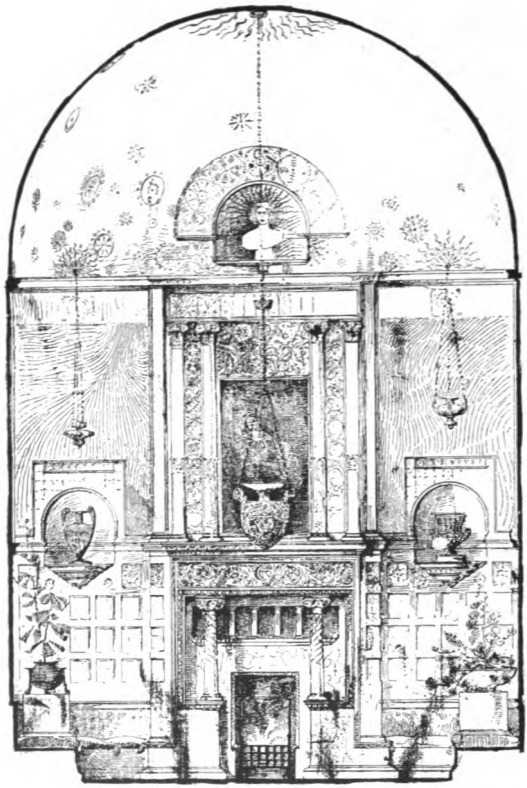


Eastern Fireplace.

sequently most likely to assist in bringing into general use the improvements I recommend. This being premised, I shall proceed, without any further preface or introduction to the investigation of the subject I have undertaken to treat.

As the immoderate size of the throats of Chimnies is the great fault of their construction, it is this fault which ought always to be attended to first in every attempt which is made to improve them; for however perfect the construction of a Fireplace may be in other respects, if the opening left for the passage of the smoke is larger than is necessary for that purpose, nothing can prevent the warm air of the room from escaping through it; and whenever this happens, there is not only an unnecessary loss of heat, but the warm air which leaves the room to go up the Chimney being replaced by cold air from without, the draughts of cold air, so often mentioned, cannot fail to be produced in the room, to the great annoyance of those who inhabit it. But although both these evils may be effectually remedied by reducing the throat of the Chimney to a proper size, yet in doing this, several precautions will



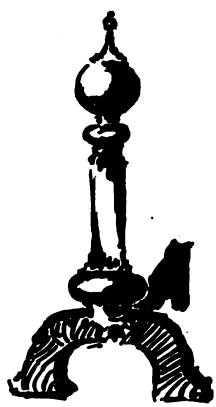


A Cabinet Design.

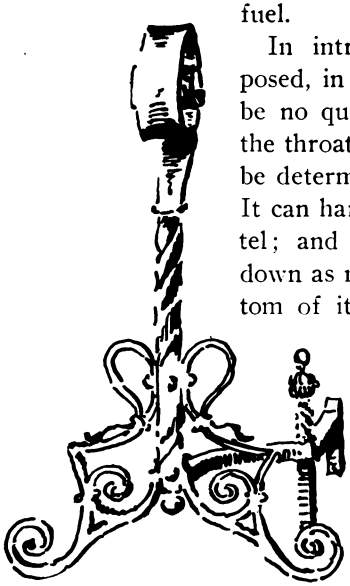
be necessary. And first of all, the throat of the Chimney should be in its proper place; that is to say, in that place in which it ought to be, in order that the ascent of the smoke may be most facilitated; for every means which can be employed for facilitating the ascent of the smoke in the Chimney must naturally tend to prevent the Chimney from smoking; now as the smoke and hot vapor which rise from a fire naturally tend upwards, the proper place for the throat of the Chimney is evidently perpendicularly over the fire.

But there is another circumstance to be attended to in determining the proper place for the throat of a Chimney, and that is, to ascertain its distance from the fire, or how far above the burning fuel it ought to be placed. In determining this point, there are many things to be considered, and several advantages and disadvantages to be weighed and balanced.

As the smoke and vapor which ascend from burning fuel rise in consequence of their being rarefied by heat, and made lighter than the air of the surrounding atmosphere; and as the degree of their rarefaction, and consequently their tend-



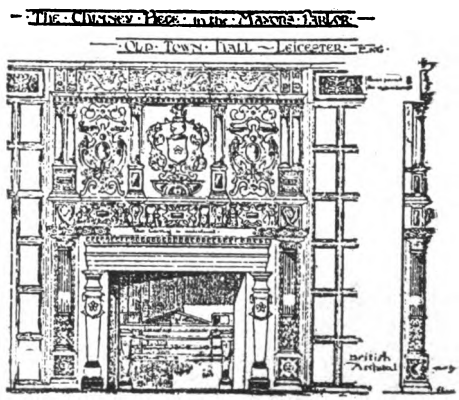
ency to rise, is in proportion to the intensity of their heat; and further, as they are hotter near the fire than at a greater distance from it, it is clear that the nearer the throat of the Chimney is to the fire, the stronger will be, what is commonly called, its draught, and the less danger there will be of its smoking. But on the other hand, when the draught of a Chimney is very strong, and particularly when this strong draught is occasioned by the throat of the chimney being very near the fire, it may so happen that the draught of air into the fire may become so strong as to cause the fuel to be consumed too rapidly. There are likewise several other inconveniences which would attend the placing of the throat of a Chimney very near the burning fuel.

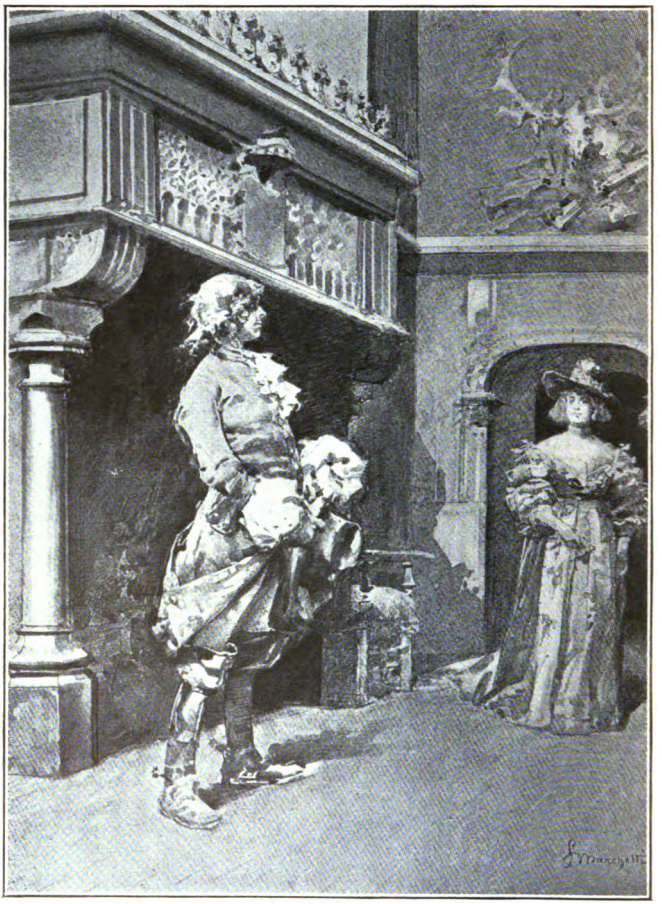


In introducing the improvements proposed, in Chimnies already built, there can be no question in regard to the height of the throat of the Chimney, for its place will be determined by the height of the mantel. It can hardly be made lower than the mantel; and it ought always to be brought down as nearly upon the level with the bottom of it as possible. If the Chimney is

apt to smoke, it will sometimes be necessary to lower the mantel or to diminish the height of the opening of the Fire-place, by throwing over a flat arch, or putting in a straight piece of stone from one side of it to the other, or, which will be still more simple and easy in practice, building a wall of bricks supported by a flat bar of iron, immediately under the mantel.

Nothing is so effectual to prevent chimnies from smoking as diminishing the opening of the Fire-place in the manner here described, and lowering and diminishing the throat of the Chimney; and I have always found, except in the single instance already mentioned, that a perfect cure may be effected by these means alone, even in the most desperate cases. It is true, that when the construction of the Chimney is very bad indeed, or its situation very unfavorable to the ascent of the smoke, and especially when both these disadvantages exist at the same time, it may sometimes be necessary to diminish the opening of the Fire-place, and particularly to lower it, and





Late Sixteenth Century.

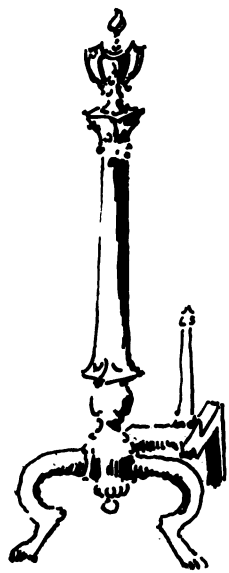
also to lower the throat of the Chimney, more than might be wished: but still I think this can produce no inconveniences to be compared with that greatest of all plagues, a smoking Chimney.

The position of the throat of a Chimney being determined, the next points to be ascertained are its size and form, and the manner in which it ought to be connected with the Fire-place below, and with the open canal of the Chimney above.

But as these investigations are intimately connected with those which relate to the form proper to be given to the Fire-place itself, we must consider them altogether.

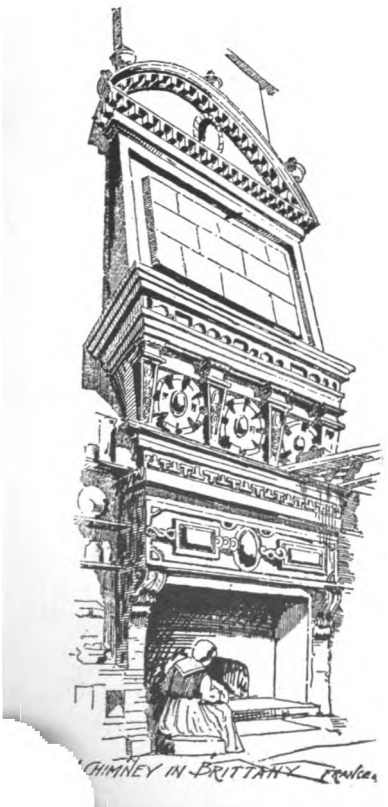
That these inquiries may be pursued with due method, and that the conclusions drawn from them may be clear and satisfactory, it will be necessary to consider, first, what the objects are which ought principally to be had in view in the construction of a Fire-place; and secondly, to see how these objects can be best attained.

Now the design of a Chimney Fire being simply to warm a room, it is necessary, first of all, to contrive matters so that the room shall be actually warmed; secondly, that



it be warmed with the smallest expense of fuel possible; and thirdly, that in warming it, the air of the room be preserved perfectly pure, and fit for respiration, and free from smoke and all disagreeable smells.

In order to take measures with certainty for warming a room by means of an open Chimney Fire, it will be necessary to consider how, or in what manner, such a fire communicates heat to a room. This question may perhaps, at the first view of it, appear to be superfluous and trifling, but a more careful examination of the matter will show it to be highly deserving of the most attentive investigation.

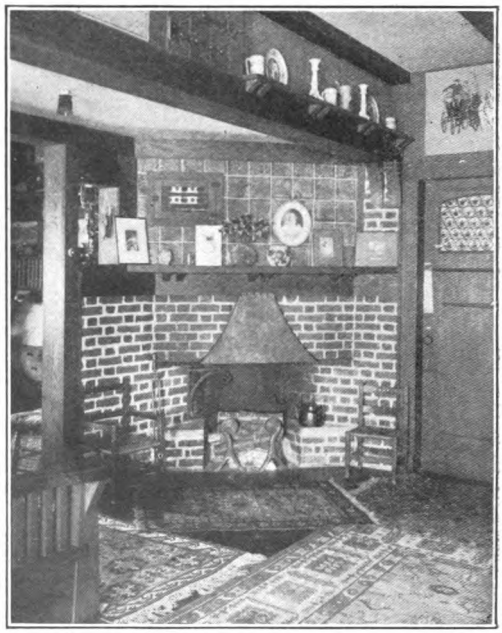


To determine in what manner a room is heated by an open Chimney Fire, it will be necessary first of all to find out, under what form the heat generated in the combustion of the fuel exists, and then to see how it is communicated to those bodies which are heated by it.

In regard to the first of these subjects of inquiry, it is quite certain that the heat which is generated in the combustion of the fuel

exists under two perfectly distinct and different forms. One part of it is combined with the smoke, vapor, and heated air which rise from the burning fuel, and goes off with them into the upper regions of the atmosphere; while the other part, which appears to be uncombined, or, as some ingenious philosophers have supposed, combined only with light, is sent off from the fire in rays in all possible directions.

With respect to the second subject of inquiry; namely, how this heat, existing under these two different forms, is communicated to other bodies; it is highly probable that the combined heat can only be communicated to other bodies by actual contact with the body with which it is combined; and in regard to the rays which are sent off by burning fuel, it is certain that they communicate or generate heat only when and where they are stopped or absorbed. In passing through the air, which is transparent, they certainly do not communicate any heat to it; and it seems highly probable that they do not communicate heat to solid bodies by which they are reflected.



Library Fireplace, Residence of C. W. Wisner, Esq.
Warwick, N. Y. E. G. W. Dietrich, Architect.

In these respects they seem to bear a great resemblance to the solar rays. But in order not to distract the attention of my reader, or carry him too far away from the subject more immediately under consideration, I must not enter too deeply into these inquiries respecting the nature and properties of what has been called radiant heat. It is certainly a most curious subject of philosophical investigation, but more time would be required to do it justice than we now have to spare. We must therefore content ourselves with such a partial examination of it, as will be sufficient for our present purpose.

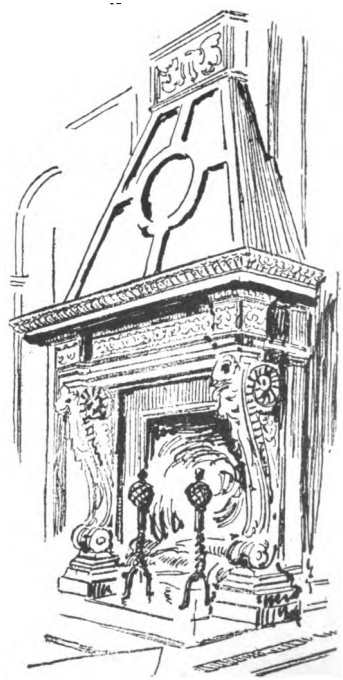
A question which naturally presents itself here is, What proportion does the radiant heat bear to the combined heat? Though that point has not yet been determined with any considerable degree of precision, it is, however, quite certain, that the quantity of heat which goes off combined with the smoke, vapor and heated air, is much more considerable, perhaps three or four times greater at least, than that which is sent off from the fire in rays —And yet, small as the quantity is of this radiant heat, it is the only part of the heat

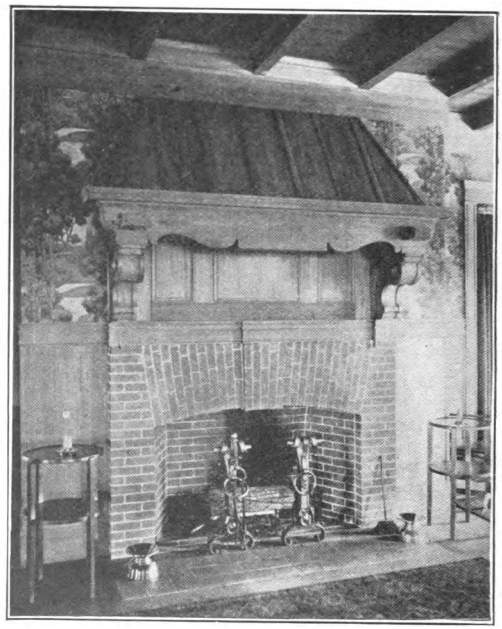
generated in the combustion of fuel burnt in an open Fire-place which can ever be employed, in heating a room.

The whole of the combined heat escapes by the Chimney, and is totally lost; and, indeed, no part of it could ever be brought into a room from an open Fire-place, without bringing along with it the smoke with which it is combined: which, of course, would render it impossible for the room to be inhabited. There is, however, one method by which combined heat, and even that which arises from open Fire-places, may be made to assist in warming a room; and that is by making it pass through something analogous to a German stove, placed in the Chimney above the fire. But of this contrivance I shall take occasion to treat more fully hereafter: In the meantime I shall continue to investigate the properties of open Chimney Fire-places, constructed on the most simple principles, such as are now in common use; and shall endeavor to point out and explain all those improvements of which they appear to me to be capable. When fuel is burnt in Fire-places

upon this simple construction, where the smoke escapes immediately by the open canal of the Chimney, it is quite evident that all the combined heat must of necessity be lost; and as it is the radiant heat alone which can be employed in heating a room, it becomes an object of much importance to determine how the greatest quantity of it may be generated in the combustion of the fuel, and how the greatest proportion possible of that generated may be brought into the room.

Now the quantity of radiant heat generated in the combustion of a given quantity of any kind of fuel depends very much upon the manner in which the fuel is consumed. When the fire burns bright, much radiant heat will be sent off from it; but when it is smothered up, very little will be generated; and indeed very little combined heat; that can be employed to any useful purpose; most of the heat produced will be immediately expended in giving elasticity to a thick dense vapor or smoke which will be seen rising from the fire;—and the com-

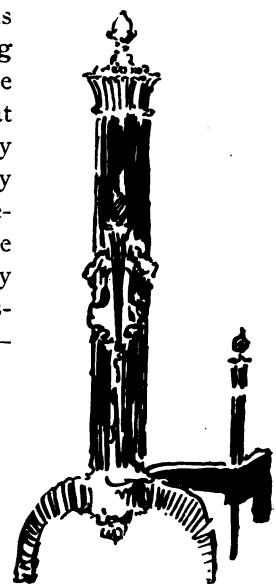




Living Room Fireplace—Tedesco Country Club.
Swampscott, Mass. Bowditch & Stratton, Architects.

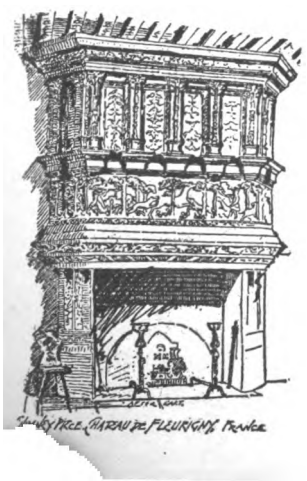
bustion being very incomplete, a great part of the inflammable matter of the fuel being merely rarefied and driven up the Chimney without being inflamed, the fuel will be wasted to little purpose. And hence it appears of how much importance it is, whether it be considered with a view to economy or to cleanliness, comfort, and elegance, to pay due attention to the management of a Chimney Fire.

Nothing can be more prefectly void of common sense, and wasteful and slovenly at the same time, than the manner in which Chimney Fires, and particularly where coals are burned, are commonly managed by servants. They throw on a load of coals at once, through which the flame is hours in making its way; and frequently it is not without much trouble that the fire is prevented from going quite out. During this time no heat is communicated to the room; and what is still worse, the throat of the Chimney being occupied merely by a heavy dense vapor, not possessed of any considerable degree of heat and consequently not having much elasticity, the warm air of the room finds less difficulty in forcing its way up the Chimney and escaping, than when the fire burns bright;—



and it happens not unfrequently, especially in Chimneys and Fire-places ill-constructed, that this current of warm air from the room which presses into the Chimney, crossing upon the current of heavy smoke which rises slowly from the fire, obstructs it in its ascent, and beats it back into the room; hence it is that Chimneys so often smoke when too large a quantity of fresh coals is put upon the fire. So many coals should never be put upon the fire at once as to prevent the free passage of the flame between. In short, a fire should never be smothered; and when proper attention is paid to the quantity of coals put on, there will be very little use for the poker; and this circumstance will contribute very much to cleanliness, and to the preservation of furniture.

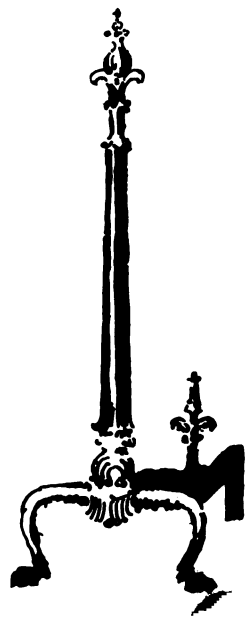
Those who have feeling enough to be made miserable by anything careless, slovenly, and wasteful which happens under their eyes—who know what comfort is, and consequently are worthy of the enjoyments of a clean hearth and cheerful fire, should really either take the trouble themselves to manage their fires (which, indeed,



would rather be an amusement to them than a trouble) or they should instruct their servants to manage them better.

But to return to the subject more immediately under consideration. As we have seen what is necessary to the production or generation of radiant heat, it remains to determine how the greatest proportion of that generated and sent off from the fire in all directions may be made to enter the room, and assist in warming it. Now as the rays which are thrown off from the burning fuel have this property in common with light, that they generate heat only when and where they are stopped or absorbed, and also in being capable of being reflected without generating heat at the surfaces of various bodies, the knowledge of these properties will enable us to take measures, with the utmost certainty, for producing the effect required,—that is to say, for bringing as much radiant heat as possible into the room.

This must be done, first, by causing as many as possible of the rays, as they are sent off from the fire in straight lines, to come directly into the room; which can only be effected by bringing the fire as far



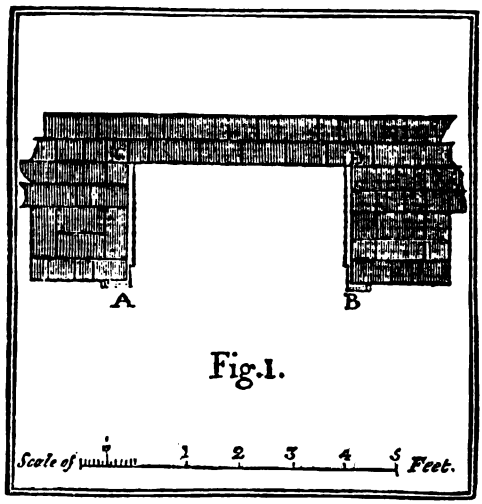


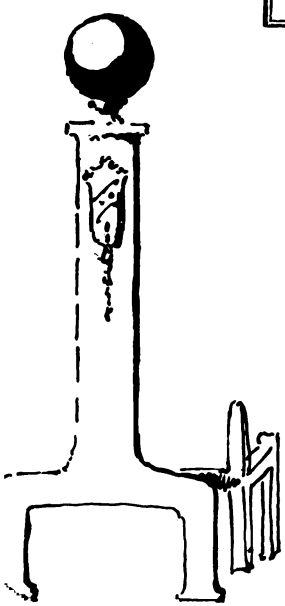
Fig. 1.

The plan of a fireplace on the common construction.

A B, the opening of the fireplace in front.

C D, the back of the fireplace.

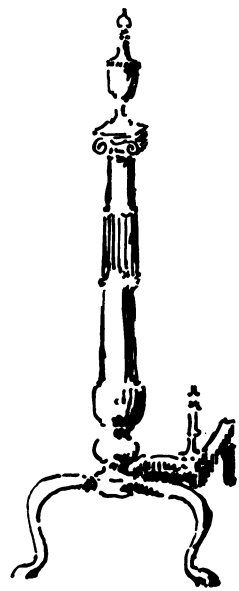
A C and B D, the covings.



forward as possible, and leaving the opening of the Fire-place as wide and as high as can be done without inconvenience; and secondly, by making the sides and back of the Fire-place of such form, and constructing them of such materials, as to cause the direct rays from the fire, which strike against them, to be sent into the room by reflection in the greatest abundance.

Now it will be found, upon examination, that the best form for the vertical sides of a Fire-place, or the covings (as they are called) is that of an upright plane, making an angle with the plane of the back of the Fire-place, of about 135 degrees.—According to the present construction of Chimneys, this angle is 90 degrees, or forms a right angle; but as in this case the two sides or covings of the Fire-place (AC, BD, Fig. 1) are parallel to each other, it is evident that they are very ill contrived for throwing into the room by reflection the rays from the fire which fall on them.

To have a clear and perfect idea of the alterations I propose in the forms of Fire-places, the reader need only observe, that, whereas the backs of Fire-places, as they are now commonly constructed, are as



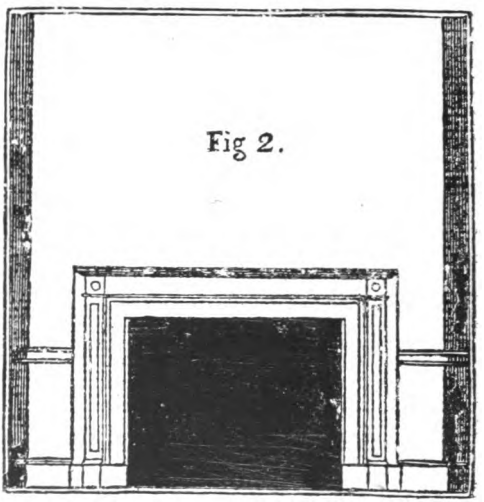
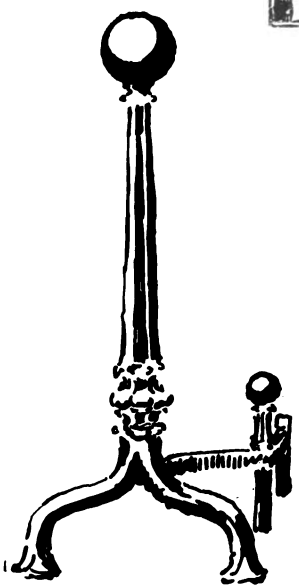


Fig. 2.
This figure shows the elevation or front view of a fireplace on the common construction.



wide as the opening of the Fire-place in front, and the sides of it are of course perpendicular to it, and parallel to each other, —in the Fire-places I recommend, the back i k, Fig. 3) is only about one-third of the width of the opening of the Fire-place in front (a b), and consequently that the two sides or covings of the Fire-place (a i and b k), instead of being perpendicular to the back, are inclined to it at an angle of about 135 degrees; and in consequence of this position, instead of being parallel to each other, each of them presents an oblique front towards the opening of the Chimney, by means of which the rays which they reflect are thrown into the room. A bare inspection of the annexed drawings (Fig. 1 and Fig. 3) will render this matter perfectly clear and intelligible.

In regard to the materials which it will be most advantageous to employ in the construction of Fire-places, so much light has, I flatter myself, already been thrown on the subject we are investigating, and the principles adopted have been established on such clear and obvious facts, that no great difficulty will attend the determination of that point.—As the object in view

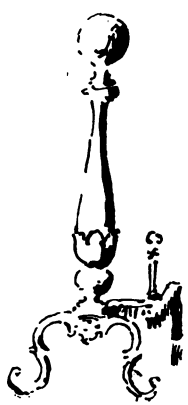
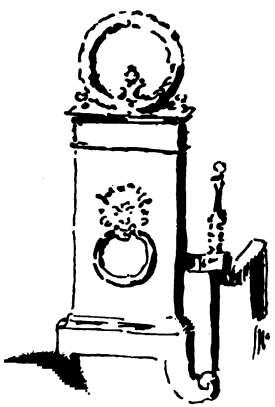


Fig. 3 shows how the fireplace represented by Fig. 1 is to be altered in order to its being improved.

A B is the opening in front, C D the back, and A C and B D the covings of the fireplace in its original state.

a b, its opening in front,—i k its back,—and a i and b k its covings after it has been altered; e is a point upon the hearth upon which a plumb suspended from the middle of the upper part of the breast of the chimney falls. The situation for the new back is ascertained by taking the line e f equal to four inches. The new back and covings are represented as being built of bricks; and the space between these and the old back and covings as being filled up with rubbish.



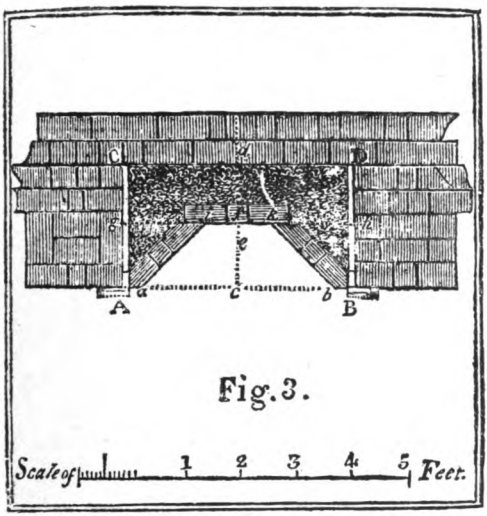
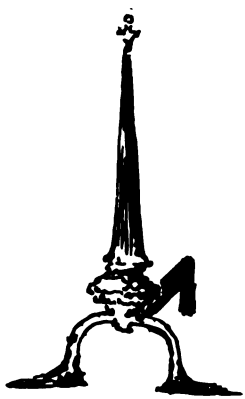


Fig. 3.



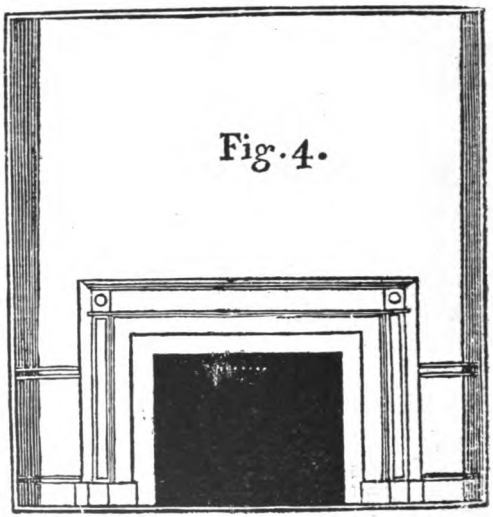
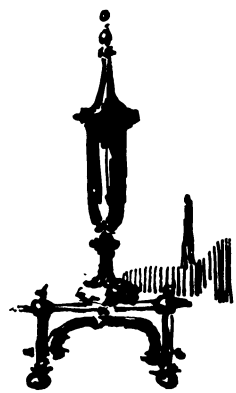


Fig. 4 represents the elevation or front view of the fireplace, Fig. 3, after it has been altered. The lower part of the doorway left for the chimney-sweeper is shown in this figure by white dotted lines.

is to bring radiant heat into the room, it is clear that that material is best for the construction of a Fire-place which reflects the most, or which absorbs the least of it; for that heat which is absorbed cannot be reflected.—Now as bodies which absorb radiant heat are necessarily heated in consequence of that absorption, to discover which of the various materials that can be employed for constructing Fire-places are best adapted for that purpose, we have only to find out by an experiment, very easy to be made, what bodies acquire least heat when exposed to the direct rays of a clear fire;—for those which are least heated, evidently absorb the least, and consequently reflect the most radiant heat.. And hence it appears that iron, and, in general, metals of all kinds, which are well known to grow very hot when exposed to the rays projected by burning fuel, are to be reckoned among the very worst materials that it is possible to employ in the construction of Fire-places.

The best materials I have hitherto been able to discover are fire-stone, and common bricks and mortar. Both these materials are, fortunately, very cheap; and as



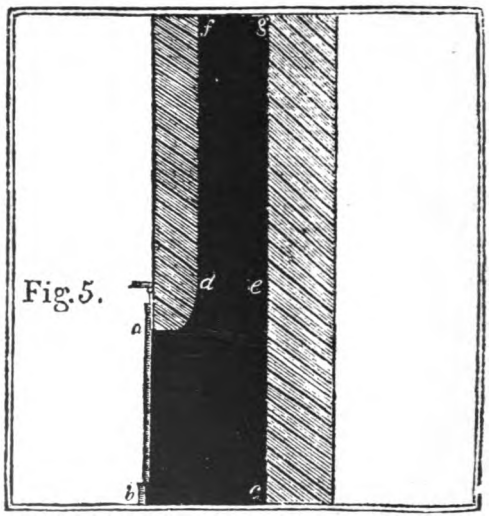
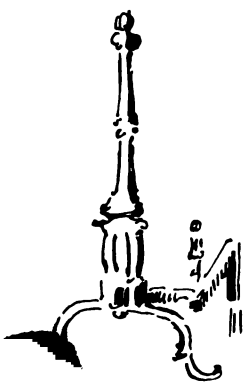


Fig.5.

Fig. 5 shows the section of the chimney fireplace and of a part of the canal of the chimney on the common construction.

a b is the opening in front; b c the depth of the fireplace at the hearth; d, the breast of the chimney.

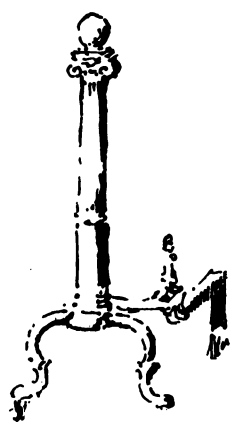
d e, the throat of the chimney, and d f, g e, a part of the open canal of the chimney.



to their comparative merits, I hardly know to which of them the preference ought to be given.

When bricks are used, they should be covered with a thin coating of plaster, which, when it has become perfectly dry, should be whitewashed. The fire-stone should likewise be whitewashed, when that is used; and every part of the Fire-place, which is not exposed to being soiled and made black by the smoke, should be kept as white and clean as possible. As white reflects more heat, as well as more light than any other color, it ought always be preferred for the inside of a Chimney Fire-place, and black, which reflects neither light nor heat, should be most avoided.

I am well aware how much the opinion I have here ventured to give, respecting the unfitness of iron and other metals to be employed in the construction of open Fire-places, differs from the opinion generally received upon that subject;—and I even know that the very reason which, according to my ideas of the matter, renders them totally unfit for the purpose is commonly assigned for making use of them, namely, that they soon grow very hot. But I would



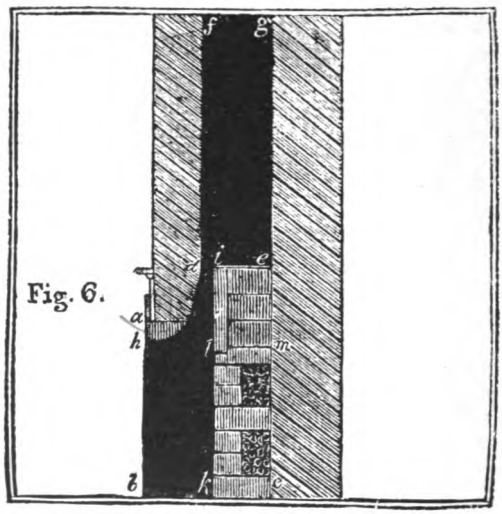
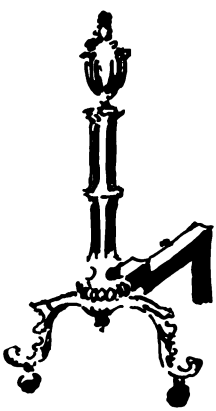


Fig. 6.

Fig. 6 shows a section of the same chimney after it has been altered.

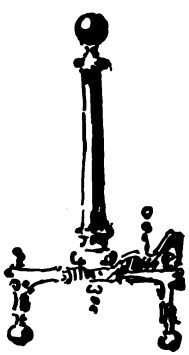
k l is the new back of the fireplace; l i, the tile or stone which closes the doorway for the chimney-sweeper; d i, the throat of the chimney, narrowed to four inches; a, the mantel, and h, the new wall made under the mantel to diminish the height of the opening of the fireplace in front.



beg leave to ask what advantage is derived from heating them?

I have shown the disadvantage of it, namely, that the quantity of radiant heat thrown into the room is diminished;—and it is easy to show that almost the whole of that absorbed by the metal is ultimately carried up the Chimney by the air, which, coming into contact with this hot metal, is heated and rarefied by it, and forcing its way upwards, goes off with the smoke; and as no current of air ever sets from any part of the opening of a Fire-place into the room, it is impossible to conceive how the heat existing in the metal composing any part of the apparatus of the Fire-place, and situated within its cavity, can come, or be brought into the room.

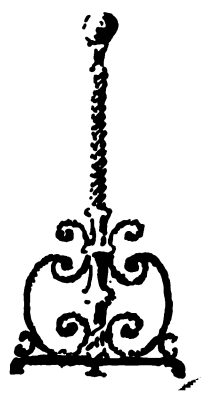
This difficulty may be in part removed, by supposing, what indeed seems to be true in a certain degree, that the heated metal sends off in rays the heat it acquires from the fire, even when it is not heated red hot; but, still, as it never can be admitted that the heat absorbed by the metal and afterwards thrown off by it in rays, is increased by this operation, nothing can be gained by it; and as much must necessarily be lost

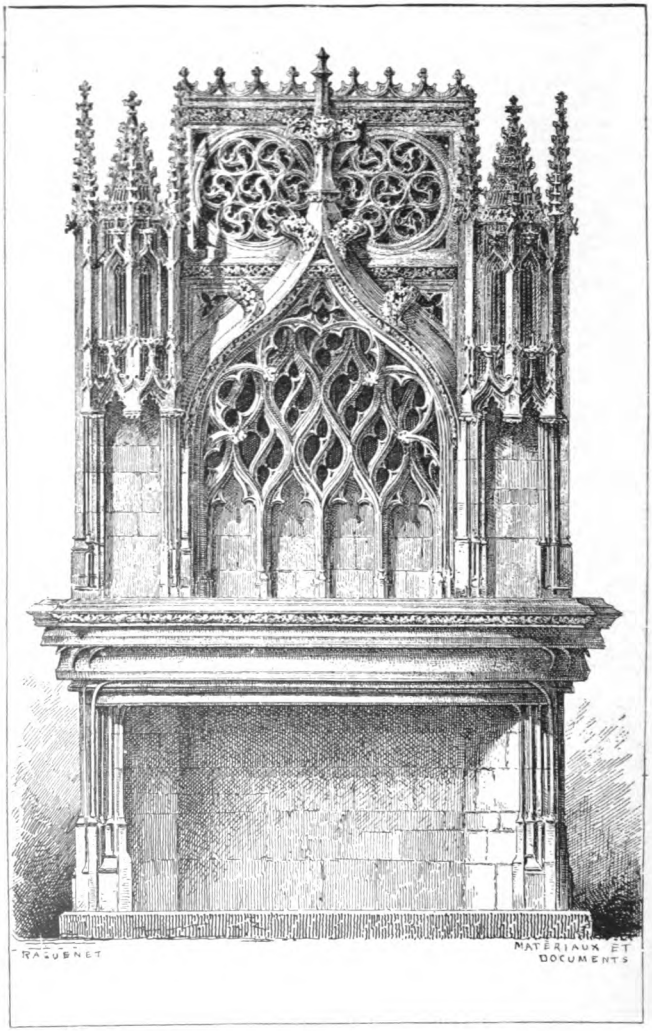


Ornate Fireplace, Chateau Blois.

in consequence of the great quantity of heat communicated by the hot metal to the air in contact with it, which, as has already been shown, always makes its way up the Chimney, and flies off into the atmosphere, the loss of heat attending the use of it is too evident to require being farther insisted on.

There is, however, in Chimney Fire-places destined for burning coals, one essential part, the grate, which cannot well be made of anything else but iron; but there is no necessity whatever for that immense quantity of iron which surrounds grates as they are now commonly constructed and fitted up, and which not only renders them very expensive, but injures very essentially the Fire-place. If it should be necessary to diminish the opening of a large Chimney in order to prevent its smoking, it is much more simple, economical, and better in all respects, to do this with marble, fire-stone, or even with bricks or mortar, than to make use of iron, which, as has already been shown, is the very worst material that can possibly be employed for that purpose; and as to registers, they are not only unnecessary, where the throat of a Chimney is

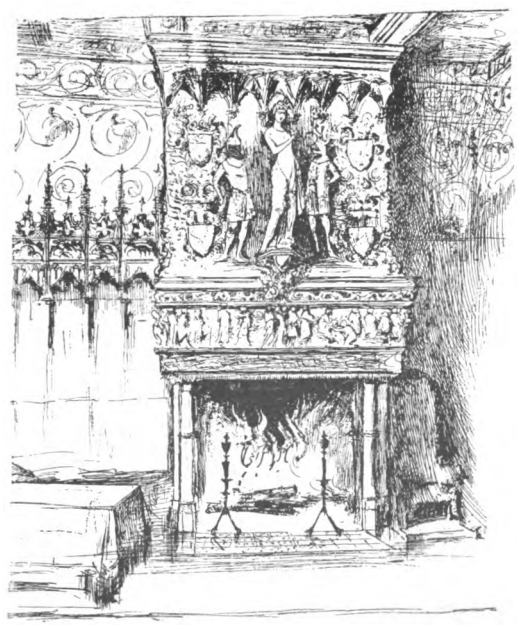


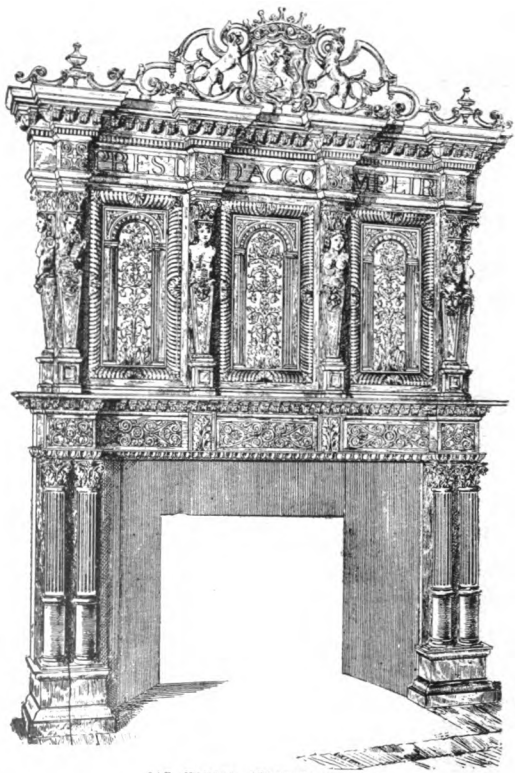


Gothic.

properly constructed, and of proper dimensions, but in that case would do much harm. If they act at all, it must be by opposing their flat surfaces to the current of rising smoke in a manner which cannot fail to embarrass and impede its motion. But we have shown that the passage of the smoke through the throat of a Chimney ought to be facilitated as much as possible, in order that it may pass by a small aperture.

Register stoves have often been found to be of use, because the fault of all Fire-places constructed upon common principles is the enormous dimensions of the throat of the Chimney. This fault has been in some measure corrected by them; but I will venture to affirm, that there never was a fire-place so corrected that would not have been improved, with less expense, by the alterations here recommended, which will be more particularly explained in the next chapter.



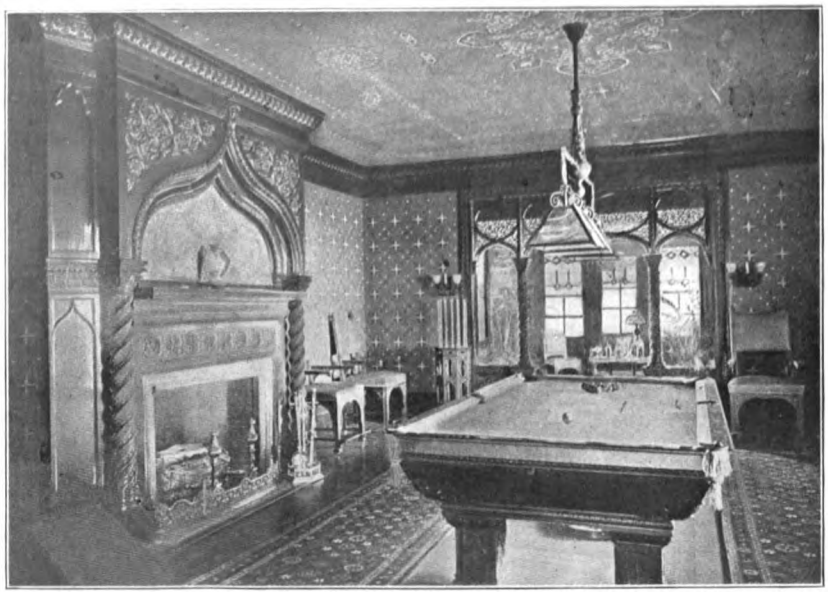


OAK MANTEL, INGESTRE HALL.

CHAPTER II.

Practical Directions designed for the use of Workmen, showing how they are to proceed in making the Alterations necessary to improve Chimney Fire-places, and effectually to cure smoking Chimneys.

All Chimney Fire-places, without exception, whether they are designed for burning wood or coals, and even those which do not smoke, as well as those which do, may be greatly improved by making the alterations in them here recommended; for it is by no means merely to prevent Chimneys from smoking that these improvements are recommended, but it is also to make them better in all other respects as Fire-places; and when the altera-

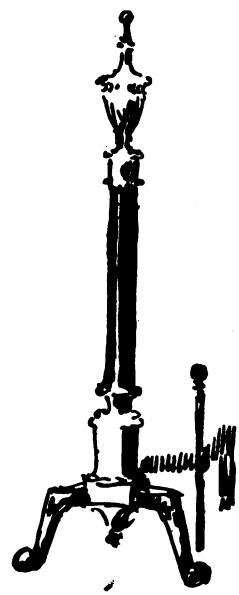


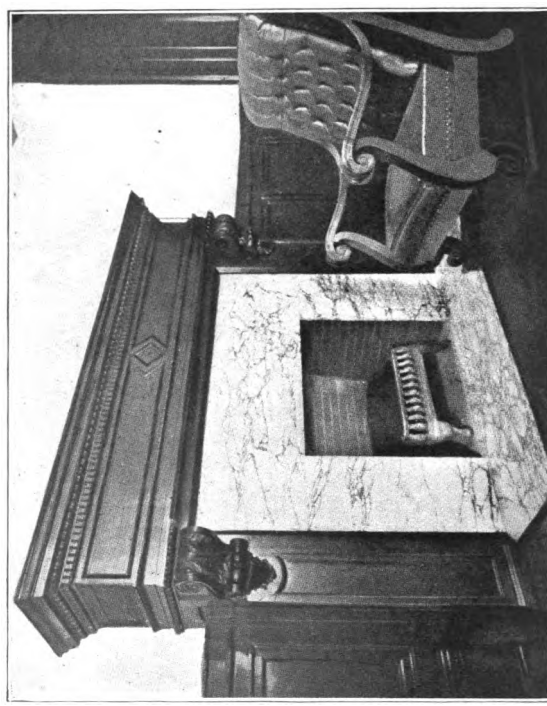
Billiard Room of Gedney Farm—Residence of Howard Willets, Esq.
W. H. Beers, Architect.

tions proposed are properly executed, which may very easily be done, with the assistance of the following plain and simple directions, the Chimneys will never fail to answer, I will venture to say, even beyond expectations. The room will be heated much more equally and more pleasantly with less than half the fuel used before; the fire will be more cheerful and more agreeable; and the general appearance of the Fire-place more neat and elegant, and the Chimney will never smoke.

The advantages which are derived from mechanical inventions and contrivances are, I know, frequently accompanied by disadvantages which it is not always possible to avoid; but in the case in question, I can say with truth, that I know of no disadvantage whatever that attends the Fire-places constructed upon the principles here recommended.—But to proceed in giving directions for the construction of these Fire-places.

That what I have to offer on this subject may be the more easily understood, it will be proper to begin by explaining the precise meaning of all those technical





Mantel in Supreme Bench Judges' Room, Baltimore Court House.
Wyatt & Nolting, Architects.

words and expressions which I may find it necessary or convenient to use.

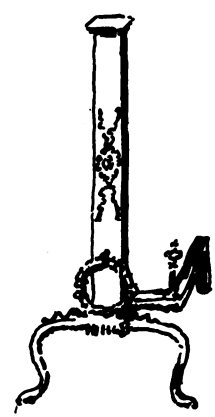
By the throat of a Chimney, I mean the lower extremity of its canal, where it unites with the upper part of its open Fire-place. —This throat is commonly found a foot above the level of the lower part of the mantel, and it is sometimes contracted to a smaller size than the rest of the canal of the Chimney and sometimes not.

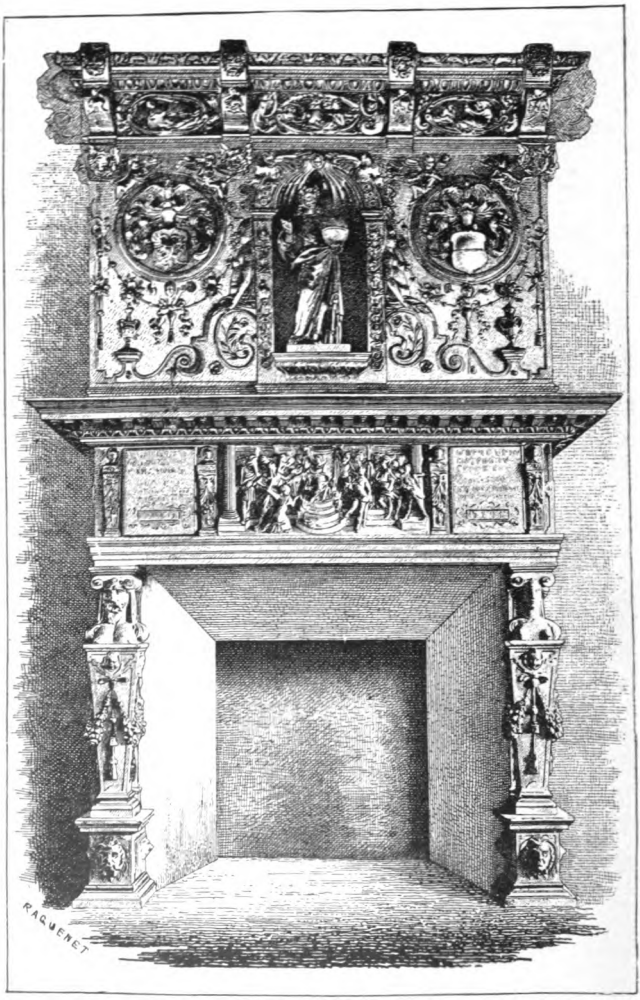
Fig. 5, shows the section of a chimney on the common construction, in which d e is the throat.

See pages 102 and 104

Fig. 6, shows the section of the same chimney altered and improved, in which d i is the reduced throat.

The breast of a Chimney is that part of it which is immediately behind the mantel.—It is the wall which forms the entrance from below into the throat of the Chimney in front, or towards the room.—It is opposite to the upper extremity of the back of the open Fire-place, and parallel to it;—in short it may be said to be the back part of the mantel itself.—In the figures 5 and 6, it is marked by the letter d. The width of the throat of the Chimney (d e Fig. 5, and d i Fig. 6) is taken from



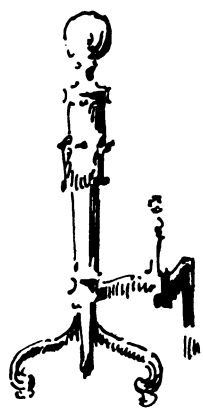


CARVED.

the breast of the Chimney to the back, and its length is taken at right angles to its width, or in a line parallel to the mantel (a Fig. 5 and 6).

Before I proceed to give particular directions respecting the exact forms and dimensions of the different parts of a Fire-place, it may be useful to make such general and practical observations upon the subject as can be clearly understood without the assistance of drawings; for the more complete the knowledge of any subject is which can be acquired without drawings, the more easy will it be to understand the drawings when it becomes necessary to have recourse to them.

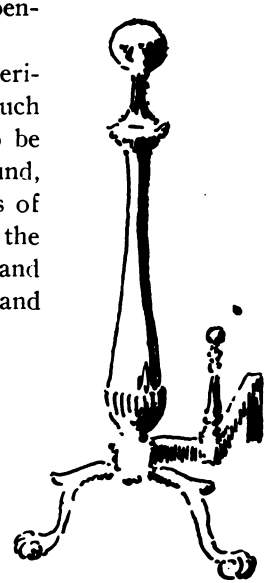
The bringing forward of the fire into the room, or rather bringing it nearer the front of the opening of the Fire-place;—and the diminishing of the throat of the Chimney, being two objects principally had in view in the alterations in Fire-places here recommended, it is evident that both these may be attained merely by bringing forward the back of the Chimney.—The only question therefore is, how far it should be brought forward?—The answer is short, and easy to be understood;—bring

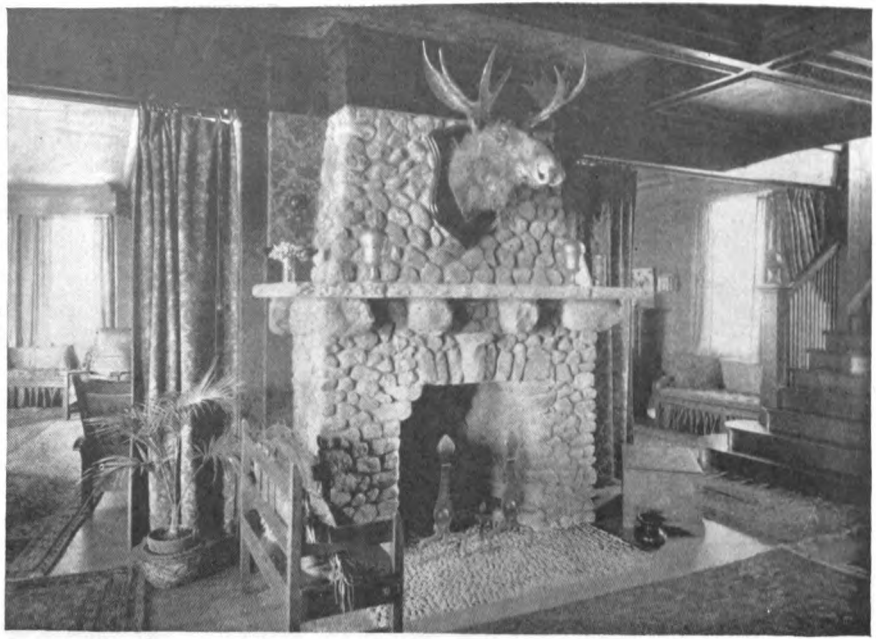


Ingle Nook Fireplace, Red Swan Inn.
E. G. W. Dietrich, Architect.

it forward as far as possible, without diminishing too much the passage which must be left for the smoke. Now as this passage, which, in its narrowest part, I have called the throat of the Chimney, ought, for reasons which are fully explained in the foregoing Chapter to be immediately, or perpendicularly over the Fire, it is evident that the back of the Chimney must always be built perfectly upright.—To determine therefore the place for the new back, or how far precisely it ought to be brought forward, nothing more is necessary than to ascertain how wide the throat of the Chimney ought to be left, or what space must be left, between the top of the breast of the Chimney, where the upright canal of the Chimney begins, and the new back of the Fire-place carried up perpendicularly to that height.

In the course of my numerous experiments upon Chimneys, I have taken much pains to determine the width proper to be given to this passage, and I have found, that, when the back of the Fire-place is of a proper width, the best width for the throat of a Chimney, when the chimney and the Fire-place are at the usual form and

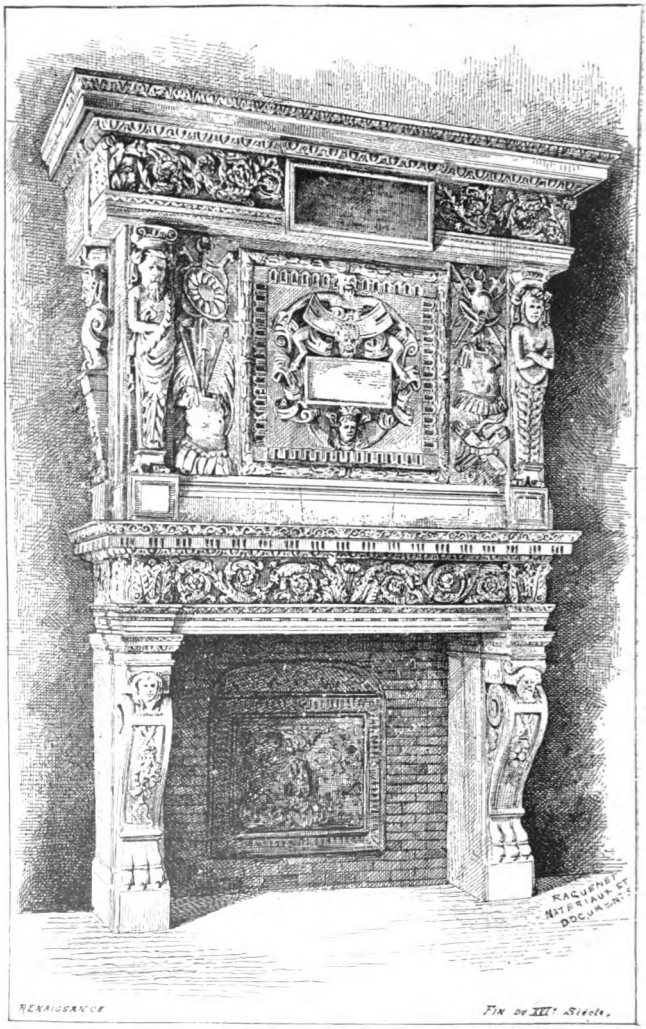




Main Hall Fireplace, "Stoneleigh." Joseph Wolf, Architect.

size, is four inches.—Three inches might sometimes answer, especially where the Fire-place is very small, and the Chimney good, and well situated: but as it is always of much importance to prevent those accidental puffs of smoke which are sometimes thrown into the room by the carelessness of servants in putting suddenly too many coals at once upon the fire, and as I found these accidents sometimes happened when the throats of Chimneys were made very narrow, I found that, upon the whole, all circumstances being considered, and advantages and disadvantages compared and balanced, four inches is the best width that can be given to the throat of a Chimney; and this, whether the Fire-place is destined to burn wood, coals, turf, or any other fuel commonly used for heating rooms by an open fire.

In Fire-places destined for heating very large halls, and where very great fires are kept up, the throat of the Chimney may, if it should be thought necessary, be made four inches and a half, or five inches wide;—but I have frequently made Fire-places for halls which have answered perfectly well where the throats of the



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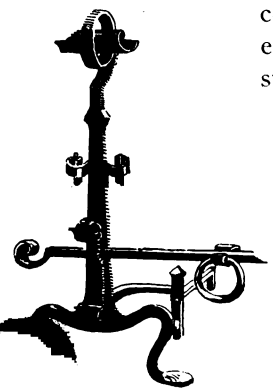
Chimneys have not been wider than four inches.

It may perhaps appear extraordinary, upon the first view of the matter, that Fire-places of such different sizes should all require the throat of the Chimney to be of the same width; but when it is considered that the capacity of the throat of a Chimney does not depend on its width alone but on its width and length taken together; and that in large Fire-places, the width of the back, and consequently the length of the throat of the Chimney, is greater than in those which are smaller, this difficulty vanishes.

And this leads us to consider another important point respecting open Fire-places, and that is, the width which it will, in each case, be proper to give to the back. In Fire-places as they are now commonly constructed, the back is of equal width with the opening of the Fire-place in front—but this construction is faulty on two accounts. —First, in a Fire-place so constructed, the sides of the Fire-place, or covings, as they are called, are parallel to each other, and consequently ill-contrived to throw out into the room the heat they receive from the fire in the form of rays;—and secondly,

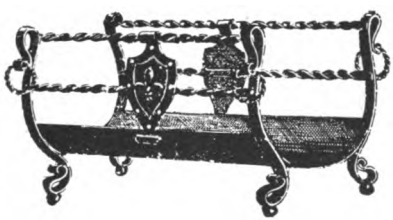
that large open corners which are formed by making the back as wide as the opening of the Fire-place in front occasion eddies of wind, which frequently disturb the fire, and embarrass the smoke in its ascent in such a manner as often to bring it into the room.—Both these defects may be entirely remedied by diminishing the width of the back of the Fire-place.—The width which, in most cases, it will be best to give it, is one-third of the width of the opening of the Fire-place in front.—But it is not absolutely necessary to conform rigorously to this decision, nor will it always be possible. It will frequently happen that the back of a Chimney must be made wider than, according to the rule here given, it ought to be.—This may be either to accommodate the Fire-place to a stove, which, being already on hand, must, to avoid the expense of purchasing a new one, be employed; or for other reasons; and any small deviation from the general rule will be attended with no considerable inconvenience. It will always be best, however, to conform to it as far as circumstances will allow.

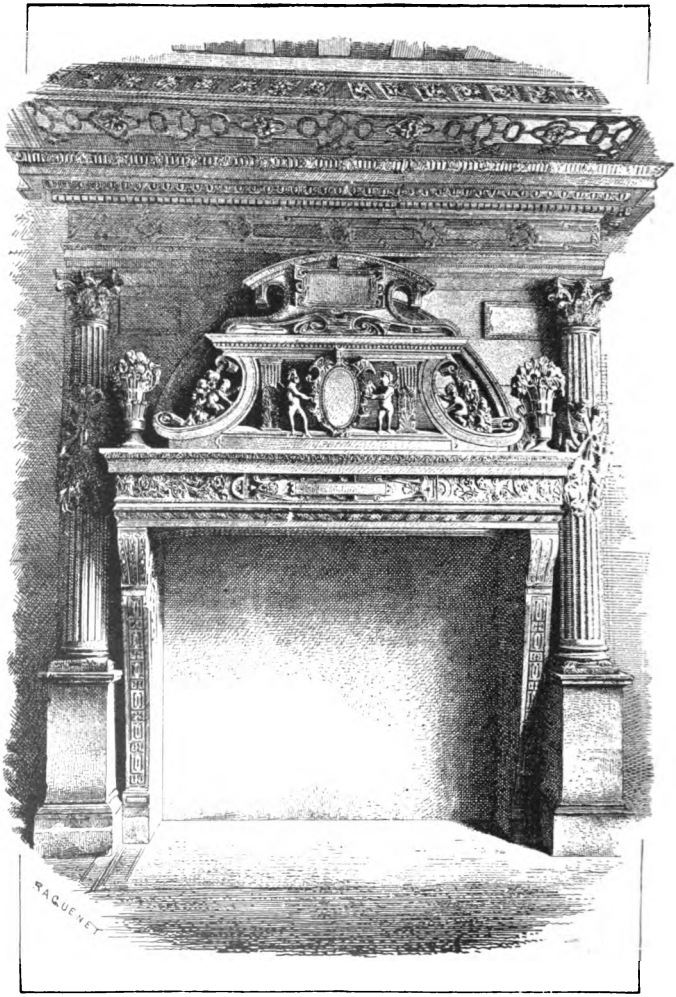


Where a Chimney is designed for warm-

ing a room of middling size, and where the thickness of the wall of the Chimney in front, measured from the front of the mantel to the breast of the Chimney, is nine inches, I should set off four inches more for the width of the throat of the Chimney, which, supposing the back of the Chimney to be built upright, as it always ought to be, will give thirteen inches for the depth of the Fire-place, measured upon the hearth, from the opening of the Fire-place in front, to the back. In this case, thirteen inches would be a good size for the width of the back, and three times thirteen inches, or thirty-nine inches, for the width of the opening of the Fire-place in front; and the angle made by the back of the Fire-place and the sides of it, or covings, would be just 135 degrees, which is the best position they can have for throwing heat into the room.

But I will suppose that in altering such a Chimney it is found necessary, in order to





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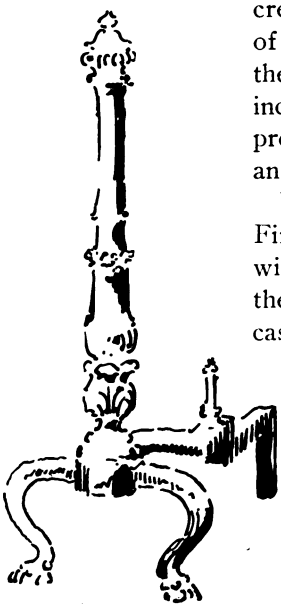
accommodate the Fire-place to a grate or stove already on hand, to make the Fire-place fifteen inches wide. In that case, I should merely increase the width of the back, to the dimensions required, without altering the depth of the Chimney, or increasing the width of the opening of the Chimney in front. The covings, it is true, would be somewhat reduced in their width, by this alteration, and their position with respect to the plan of the back of the Chimney would be a little changed; but these alterations would produce no bad effects of any considerable consequence, and would be much less likely to injure the Fire-place, than an attempt to bring the proportions of its parts nearer to the standard, by increasing the depth of the Chimney, and the width of its opening in front; or than an attempt to preserve that particular obliquity of the covings which is recommended as the best, (135 degrees) by increasing the width of the opening of the Fire-place, without increasing its depth.

In order to illustrate this subject more fully, we will suppose one case more. We will suppose that in the Chimney which is to be altered, the width of the Fire-place

in front is either wider or narrower than it ought to be, in order that the different parts of the Fire-place, after it is altered, may be of the proper dimensions. In this case, I should determine the depth of the Fire-place, and the width of the back of it, without any regard to the width of the opening of the Fire-place in front; and when this is done, if the opening of the Fire-place should be only two or three inches too wide, that is to say, only two or three inches wider than is necessary in order that the covings may be brought into their proper position with respect to the back. I should not alter the width of this opening, but should accommodate the covings by this width, by increasing their breadth, and increasing the angle they make with the back of the Fire-place;—but if the opening of the Fire-place should be more than three inches too wide; I should reduce it to the proper width by slips of stone, or by bricks and mortar.

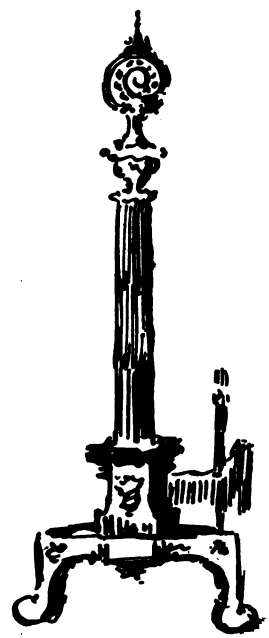


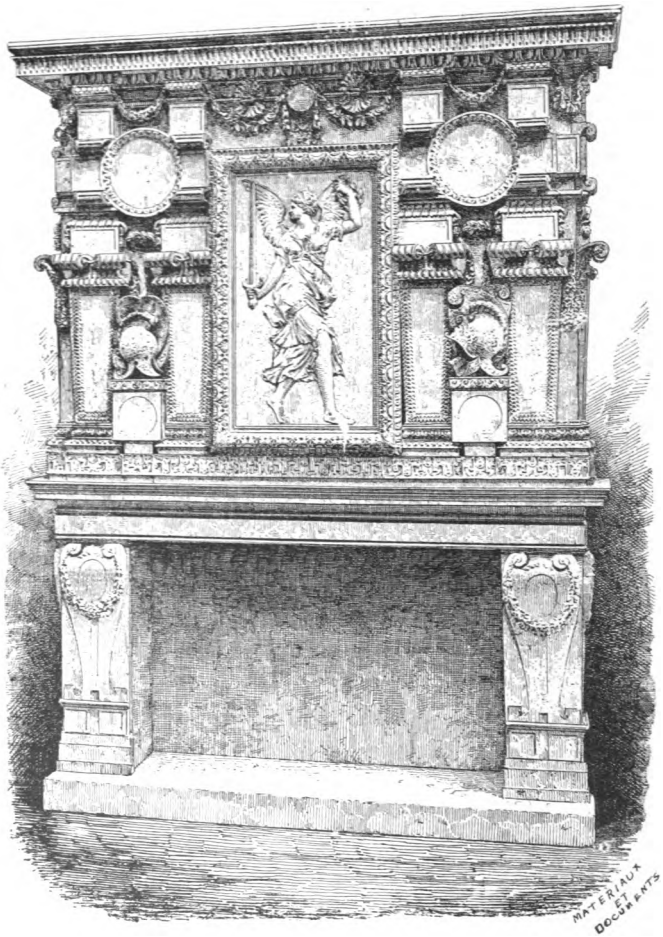
When the width of the opening of the Fire-place, in front is very great, compared with the depth of the Fire-place, and with the width of the back, the covings in that case being very wide, and consequently

very oblique, and the Fire-place very shallow, any sudden motion of the air in front of the Fire-place, (that motion, for instance, which would be occasioned by the clothes of a woman passing hastily before the fire, and very near it), would be apt to cause eddies in the air, within the opening of the Fire-place, by which puffs of smoke might easily be brought into the room.

Should the opening of the Chimney be too narrow, which however will very seldom be found to be the case, it will, in general be advisable to let it remain as it is, and to accommodate the covings to it, rather than to attempt to increase its width, which would be attended with a good deal of trouble, and probably a considerable expense.

From all that has been said it is evident, that the points of the greatest importance, and which ought most particularly to be attended to, in altering Fire-places upon the principles here recommended, are, the bringing forward the back to its proper place, and making it of proper width. But it is time that I should mention another matter upon which it is probable that my reader is already impatient to receive in-





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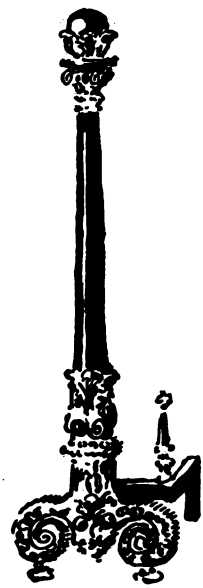
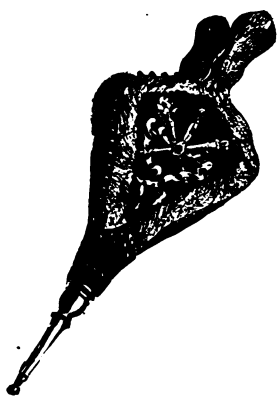
formation. Provision must be made for the passage of the Chimney sweeper up the Chimney. This may be easily done in the following manner: In building up the new back of the Fire-place; when this wall, (which need never be more than the width of a single brick in thickness) is brought up so high that there remains no more than about ten or eleven inches between what is then the top of it, and the inside of the mantel, or lower extremity of the breast of the Chimney, an opening, or door-way, eleven or twelve inches wide, must be begun in the middle of the back, and continued quite to the top of it, which, according to the height to which it will commonly be necessary to carry up the back, will make the opening about twelve or fourteen inches high; which will be quite sufficient to allow a Chimney sweeper to pass. When the Fire-place is finished, this doorway is to be closed by a few bricks, by a tile, or a fit piece or stone, placed in it, dry, or without mortar, and confined in its place by means of a rabbet made for that purpose in the brick-work. As often as the Chimney is swept, the Chimney-sweeper takes down this temporary wall, which is



very easily done, and when he has finished his work, he puts it again into its place. The annexed drawing (No. 6) will give a clear idea of this contrivance; and the experience I have had of it has proved that it answers perfectly well the purpose for which it is designed.

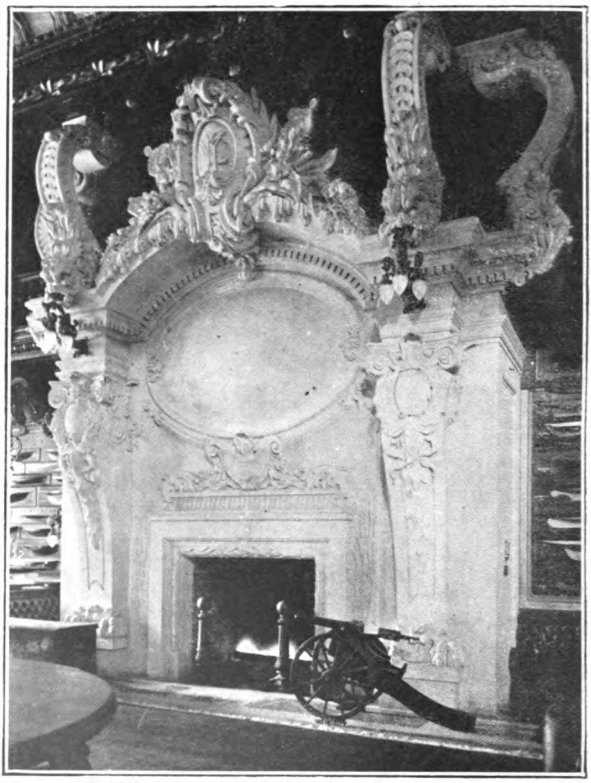
See page 104.

I observed above, that the new back, which it will always be found necessary to build in order to bring the fire sufficiently forward, in altering a Chimney constructed of the common principles, need never be thicker than the width of a common brick. I may say the same of the thickness necessary to be given to the new sides, or covings, of the Chimney; or if the new back and covings are constructed of stone, one inch and three quarters, or two inches in thickness will be sufficient. Care should be taken in building up these new walls to unite the back to the covings in a solid manner.



Whether the new back and covings are constructed of stone, or built of bricks, the space between them and the old back and covings of the Chimney ought to be filled up, to give greater solidity to the structure. This may be done with loose rubbish, or pieces of broken bricks, or stones, provided the work be strengthened by a few layers or courses of bricks laid in mortar; but it will be indispensably necessary to finish the work, where these new walls end, that is to say, at the top of the throat of the Chimney, where it ends abruptly in the open canal of the Chimney by a horizontal course of bricks well secured with mortar. This course of bricks will be upon a level with the top of the door-way left for the Chimney-sweeper.

From these descriptions it is clear, that where the throat of the Chimney has an end, that is to say, where it enters into the lower part of the open canal of the Chimney, there the three walls which form the two covings and the back of the Fire-place all end abruptly. It is of much importance that they should end in this manner; for were they to be sloped outward and raised in such a manner as to swell out the upper

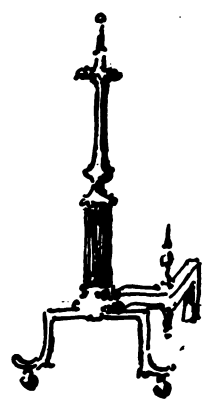


Great Fireplace of Caen Stone in Model Room of New York Yacht Club.

Warren and Wetmore, Architects.

extremity of the throat of the Chimney in the form of a trumpet, and increase it by degrees to the size of the canal of the Chimney, this manner of uniting the lower extremity of the canal of the Chimney with the throat would tend to assist the winds which may attempt to blow down the Chimney, in forcing their way through the throat, and throwing the smoke backward into the room; but when the throat of the Chimney ends abruptly, and ends of the new walls form a flat horizontal surface, it will be much more difficult for any wind from above to find and force its way through the narrow passage of the throat of the Chimney.

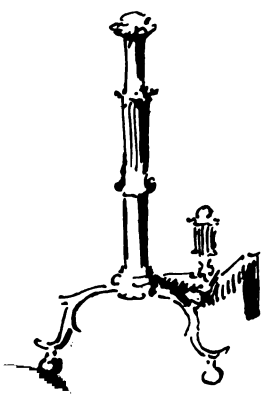
As the two walls which form the new covings of the Chimney are not parallel to each other; but inclined, presenting an oblique surface towards the front of the Chimney, and as they are built perfectly upright and quite flat, from the hearth to the top of the throat, where they end, it is evident that a horizontal section of the throat will not be an oblong square; but its deviation from that form is a matter of no consequence; and no attempts should ever be made, by twisting the covings



above, where they approach the breast of the Chimney, to bring it to that form. All twists, bends, prominences, excavations, and other irregularities of form, in the covings of a Chimney, never fail to produce eddies in the current of the air which is continually passing into, and through an open Fire-place in which a fire is burning; and all such eddies disturb, either the fire, or the ascending current of smoke, or both; and not unfrequently cause the smoke to be thrown back into the room. Hence it appears, that the covings of Chimnies should never be made circular, or in the form of any other curve; but always quite flat.

For the same reason, that is to say, to prevent eddies, the breast of the chimney which forms the side of the throat is in front, or nearest to the room, should be neatly cleaned off, and its surface be made quite regular and smooth.

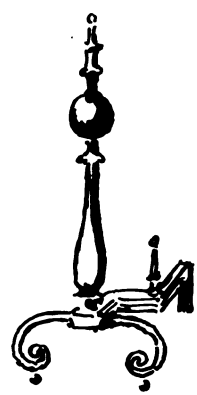
This may easily be done by covering it with a coat of plaster, which may be made thicker or thinner in different parts as may be necessary in order to bring the breast of the Chimney to be of the proper form.

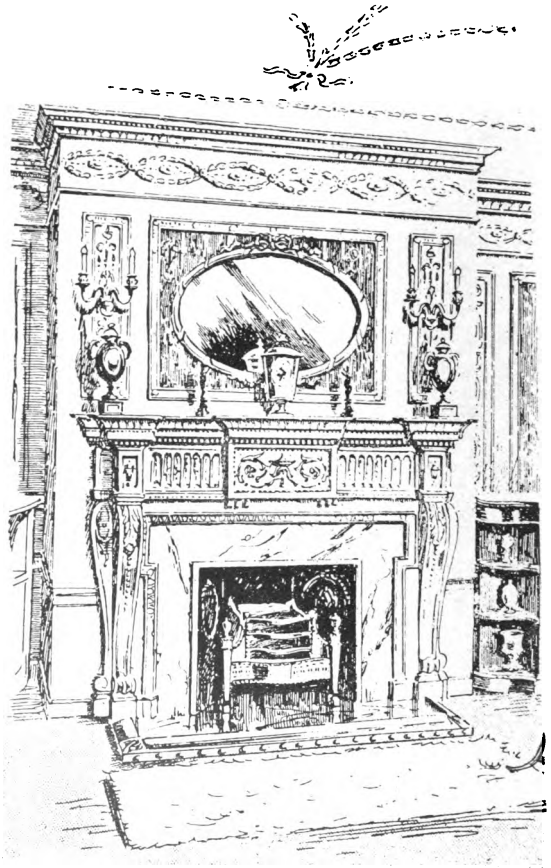


With regard to the form of the breast of a Chimney, this is a matter of very great

importance, and which ought always to be particularly attended to. The worst form it can have is that of a vertical plane, or upright flat; and next to this, the worst form is an inclined plane. Both these forms cause the current of warm air from the room, which will, in spite of every precaution, sometimes find its way into the Chimney, to cross upon the current of the smoke, which rises from the fire, in a manner most likely to embarrass it in its ascent, and drive it back. The inclined plane which is formed by a flat register placed in the throat of the Chimney produces the same effects; and this is one reason, among many others, which have induced me to disapprove of register stoves.

The current of air which, passing under the mantel, gets into the Chimney, should be made gradually to bend its course upwards, by which means it will unite quietly with the ascending current of smoke, and will be less likely to check it, or force it back into the room. Now this may be effected with the greatest ease and certainty, merely by rounding off the breast of the Chimney or back part of the mantel, instead of leaving it flat, or full of holes and

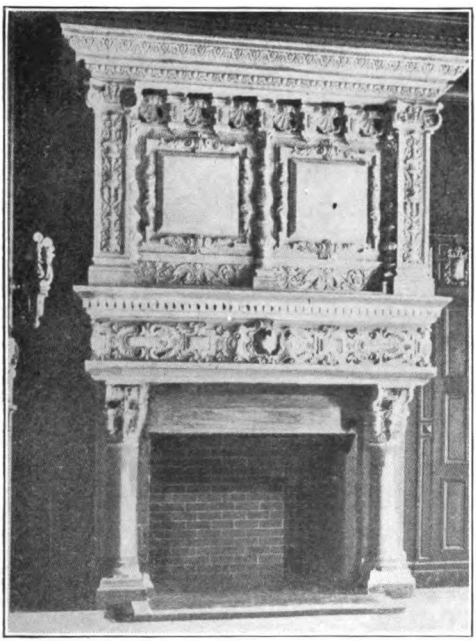




MODERN DESIGN.

corners; and this of course ought always to be done.

I have hitherto given no precise directions in regard to the height to which the

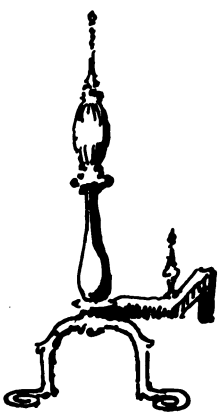


new back and covings ought to be carried: This will depend not only on the height of the mantel, but also, and more especially, on the height of the breast of the Chimney,

or of that part of the Chimney where the breast ends and the upright canal begins. The back and covings must raise a few inches, five or six, for instance, higher than this part, otherwise the throat of the Chimney will not be properly formed; but I know of no advantages that would be gained by carrying them still higher.

I mentioned above, that the space between the walls which form the new back and covings, and the old back sides of the Fire-place, should be filled up; but this must not be understood to apply to the space between the wall of dry bricks, or the tile which closes the passage for the Chimney-sweeper, and the old back of the Chimney; for that space must be left void, otherwise, though this tile, (which at most will not be more than two inches in thickness) were taken away, there would not be room sufficient for him to pass.

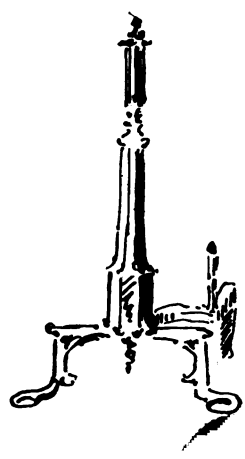
In forming this door-way, the best method of proceeding is to place the tile or flat piece of stone destined for closing it, in its proper place; and to build round it, or rather by the sides of it; taking care not to bring any mortar near it, in order that it may easily be removed when the



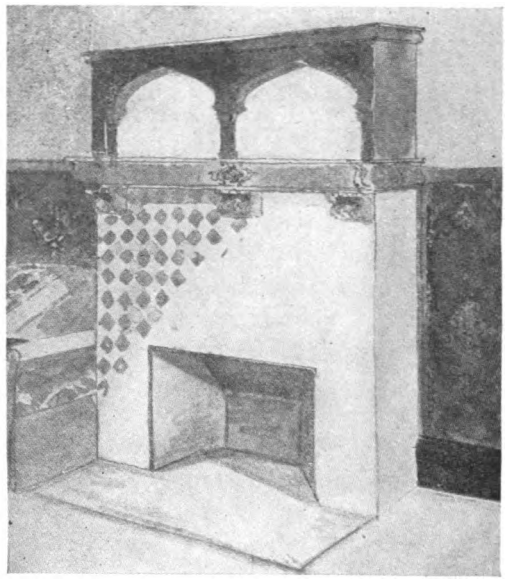
door-way is finished. With regard to the rabbet which should be made in the door-way to receive it and fix it more firmly in its place, this may either be formed at the same time when the door-way is built, or it may be made after it is finished, by attaching to its bottom and sides, with strong mortar, pieces of thin roof tiles. Such as are about half an inch in thickness will be best for this use; if they are thicker they will diminish too much the opening of the door-way, and will likewise be more liable to be torn away by the Chimney-sweeper in passing up and down the Chimney.

It will hardly be necessary for me to add, that the tile or flat stone, or wall of dry bricks, which is used for closing up this door-way, must be of sufficient height to reach quite up to the level with the top of the walls which form the new back and covings of the Chimnies.

I ought, perhaps, to apologize for having been so very particular in these descriptions and explanations, but it must be remembered that this chapter is written principally for the information of those who, having had few opportunities of employing their attention in abstruse philosophical re-

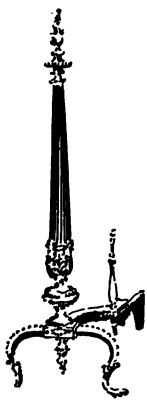


searches, are not sufficiently practiced in these intricate investigations, to seize with facility, new ideas; and consequently, that



I have frequently been obliged to labor to make myself understood.

I have only to express my wishes that my reader may not be more fatigued with this labor than I have been; for we shall then most certainly be satisfied with each



other. But to return once more to the charge. There is one more important circumstance respecting Chimney Fire-places destined for burning coals, which still remains to be farther examined; and that is the Grate.

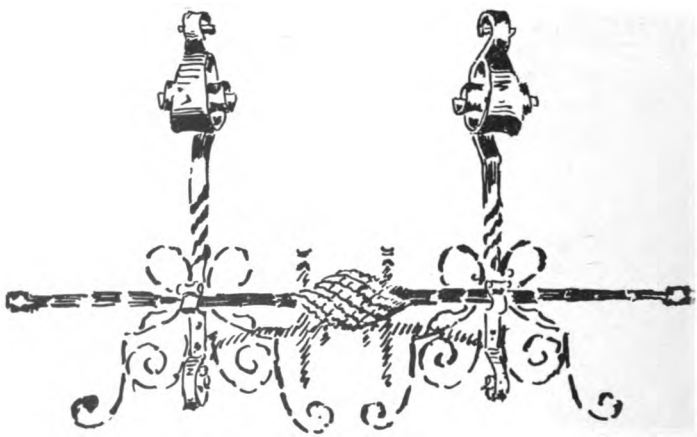
Although there are few grates that may not be used in Chimnies constructed or altered upon the principles here recommended, yet they are not, by any means, all equally well-adapted for that purpose. Those whose construction is the most simple, and which of course are the cheapest, are beyond comparison the best, on all accounts. Nothing being wanted in these Chimnies but merely a grate for containing the coals, and in which they will burn with a clear fire; and all additional apparatus being, not only useless, but very pernicious, all complicated and expensive grates should be laid aside, and such as are more simple, substituted in the room of them. And in the choice of a grate, as in everything else, beauty and elegance may easily be united with the most perfect simplicity. Indeed they are incompatible with everything else.

In placing the grate, the thing principally

to be attended to is, to make the back of it coincide with the back of the Fire-place; but as many of the grates now in common use will be found to be too large, when the Fire-places are altered and improved, it will be necessary to diminish their capacities by filling them up at the back and sides with pieces of fire-stone.

When this is done, it is the front of the flat piece of fire-stone which is made to form a new back to the grate, which must be made to coincide with, and make part of the back, of the Fire-place. But in diminishing the capacities of grates with pieces of fire-stone, care must be taken not to make them too narrow.

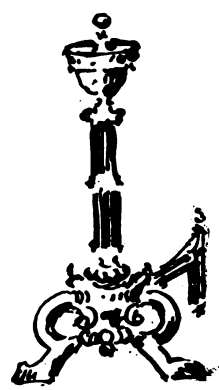
The proper width for grates destined for rooms of middling size will be from six to eight inches, and their length may be di-

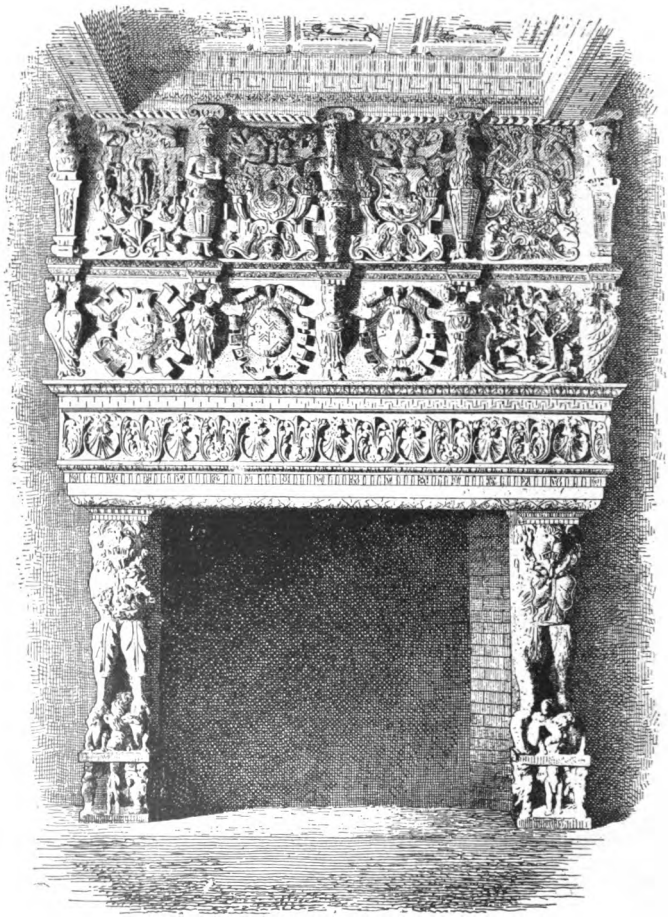


minished more or less, according as the room is heated with more or less difficulty, or as the weather is more or less severe. But where the width of the grate is not more than five inches, it will be very difficult to prevent the fire from going out.

It goes out for the same reason that a live coal from the grate that falls upon the hearth soon ceases to be red hot; it is cooled by the surrounding cold air of the atmosphere. The knowledge of the cause which produces this effect is important, as it indicates the means which may be used for preventing it. But of this subject I shall treat more fully hereafter.

It frequently happens that the iron backs of grates are not vertical or upright, but inclined backwards. When these grates are so much too wide as to render it necessary to fill them up behind with fire-stone, the inclination of the back will be of little consequence, for by making the piece of stone with which the width of the grate is to be diminished in the form of a wedge, or thicker above than below, the front of this stone, which in effect will become the back of the grate, may be made perfectly vertical; and the iron back of the grate be-

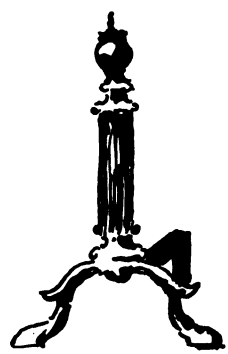




ELABORATELY CARVED.

ing hid in the solid work of the back of the Fire-place, will produce no effect whatever; but if the grate be already so narrow as not to admit of any diminution of its width, in this case it will be best to take away the iron back of the grate entirely, and fixing the grate firmly in the brick work, cause the back of the Fire-place to serve as a back to the grate. This I have very frequently done, and have always found it to answer perfectly well.

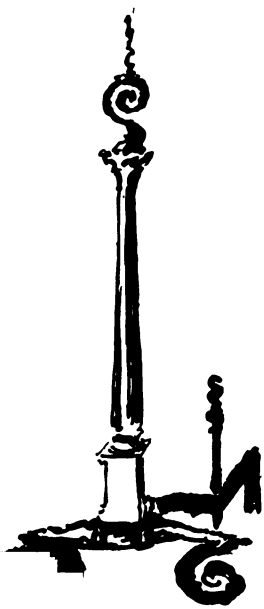
Where it is necessary that the fire in the grate should be very small, it would be best in reducing the grate with fire-stone, to bring its cavity, destined for containing the fuel, to the form of one-half of a hollow hemisphere; the two semicircular openings being one above, to receive the coals, and the other in front, or towards the bars of the grate; for when the coals are burnt in such a confined space, and surrounded on all sides, except in the front and above, by fire-stone, (a substance peculiarly well adapted for confining heat) the heat of the fire will be concentrated, and cold air of the atmosphere being kept at a distance, a much smaller quantity of coals will burn, than could possibly be made to burn in a



grate where they would be more exposed, to be cooled by the surrounding air, or to have their heat carried off by being in contact with iron, or with any other substance through which heat passes with greater facility than through fire-stone.

Being persuaded that if the improvements in the Chimney Fire-places here recommended should be generally adopted, (which I cannot help flattering myself will be the case) that it will become necessary to reduce, very considerably, the sizes of grates, I was desirous of showing how this may, with the greatest safety and facility, be done.

Where grates, which are designed for room of a middling size, are longer than fourteen or fifteen inches, it will always be best, not merely to diminish their lengths, by filling them up at their two ends with fire-stone, but, forming the back of the Chimney of a proper width, without paying any attention to the length of the grate, to carry the covings through the two ends of the grate in such a manner as to conceal them, or at least to conceal the back corners of them in the walls of the covings.



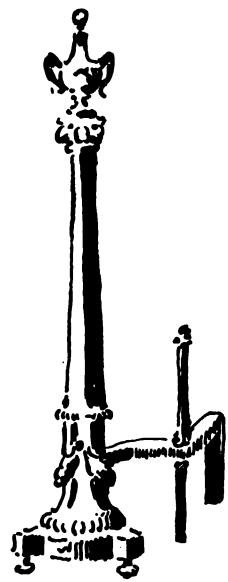
I cannot help flattering myself that the

directions here given in regard to the alterations which it may be necessary to make in Fire-places, in order to introduce the improvements proposed, will be found to be so perfectly plain and intelligible that no one who reads them will be at any loss respecting the manner in which the work is to be performed; but as order and arrangement tend much to facilitate all mechanical operations, I shall here give a few short directions respecting the manner of laying out the work, which may be found useful, and particularly to gentlemen who may undertake to be their own architects, in ordering and directing the alterations to be made for the improvement of their Fire-places.

Directions for laying out the work:

If there be a grate in the Chimney which is to be altered, it will always be best to take it away, and when this is done, the rubbish must be removed, and hearth swept perfectly clean.

Suppose the annexed figure No. 1 to represent the ground plan of such a Fire-place; A B being the opening of it in front, A C and B D the two sides or covings, and C D the back.



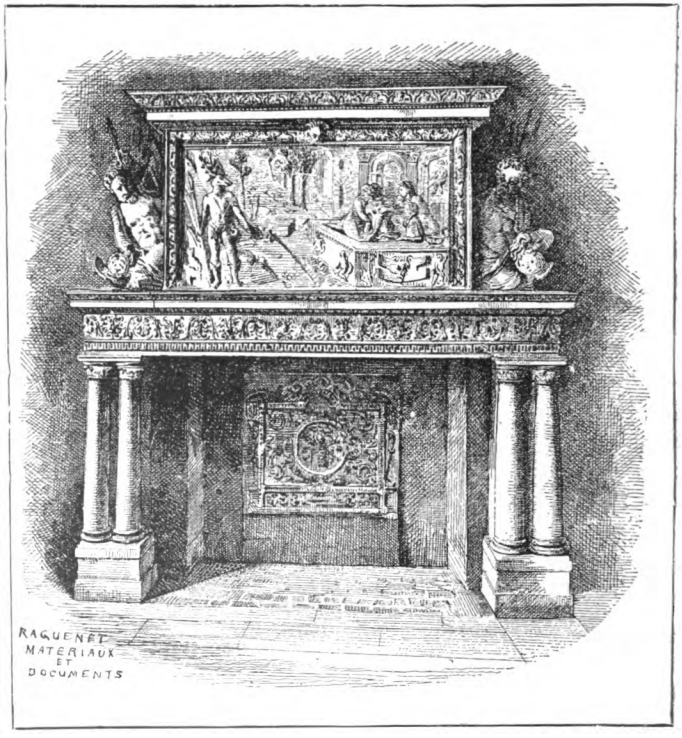

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Figure 2 shows the elevation of this Fire-place. First, draw a straight line, with chalk, or with a lead pencil, upon the hearth, from one jamb to the other, even with the front of the jamb. The dotted line A B, figure 3, may represent this line.

See page 96.

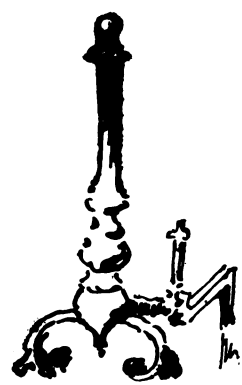
See page 98.

From the middle C of this line, (A B) another line c d, is to be drawn perpendicular to it, across the hearth to the middle d, of the back of the Chimney.

A person must now stand upright in the Chimney, with his back to the back of the Chimney, and hold a plumb-line to the middle of the upper part of the breast of the Chimney (d, fig. 5) or where the canal of the Chimney begins to rise perpendicularly;—taking care to place the line above in such a manner that the plumb may fall on the line c d, drawn on the hearth from the middle of the opening of the Chimney in front to the middle of the back, and an assistant must mark the precise place e, on that line where the plumb falls.

See page 102.

This being done, and the person in the Chimney having quitted his station, four inches are to be set off on the line c d, from e, towards d; and the point f, where these four inches end, (which must be marked

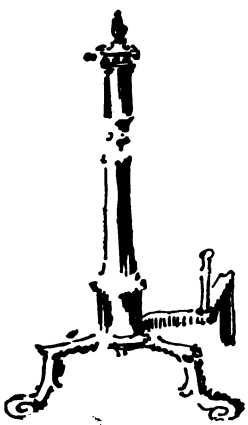


with chalk or with a pencil) will show how far the new back is to be brought forward.

Through f, draw the line g h, parallel to the line A B, and this line g h will show the direction of the new back, or the ground line on which it is to be built.

The line c f will show the depth of the new Fire-place; and if it should happen that c f is equal to about one-third of the line A B; and if the grate can be accommodated to the Fire-place instead of its being necessary to accommodate the Fire-place to the grate, in that case, half the length of the line c f, is to be set off from f on the line g f h, on one side to k, and on the other to i, and the line i k will show the ground line of the forepart of the back of the Chimney.

In all cases where the width of the opening of the Fire-place in front (A B) happens to be not greater, or not more than two or three inches greater than three times the width of the new back of the Chimney (i k) this opening may be left, and lines drawn from i to A, and from k to B, will show the width and position of the front of the new covings; but when the opening of the Fire-place in front is still



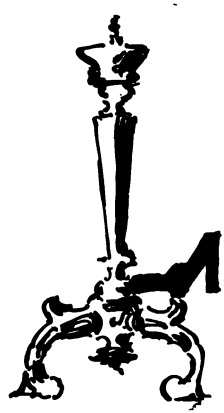
wider, it must be reduced, which is to be done in the following manner:

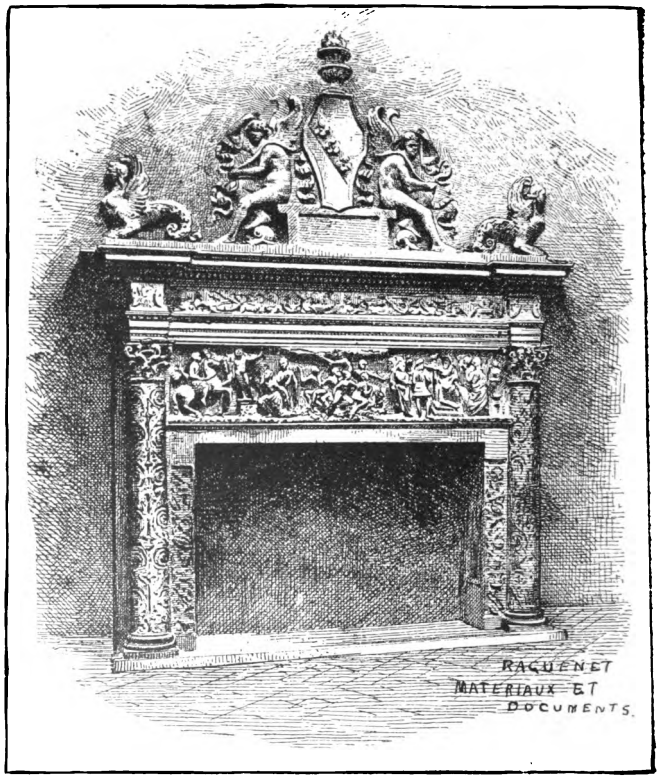
From c, the middle of the line A B, c a and c b, must be set off equal to the width of the back (i k) added to half its width (f i) and lines drawn from i to a and from k to b, will show the ground plan of the fronts of the new covings.

When this is done nothing more will be necessary than to build up the back and covings; and if the Fire-place is designed for burning coals, to fix the grate in its proper place, according to the directions already given. When the width of the Fire-place is reduced, the edges of the covings a A and b B are to make a finish with the front of the jambs. And in general it will be best, not only for the sake of the appearance of the Chimney, but for the other reasons also to lower the height of the opening of the Fire-place, whenever its width in front is diminished.

Fig. 4 shows a front view of the Chimney after it has been altered according to the directions here given. By comparing it with fig. 2 (which shows a front view of the same Chimney before it was altered) the manner in which the opening of the

See page 100.

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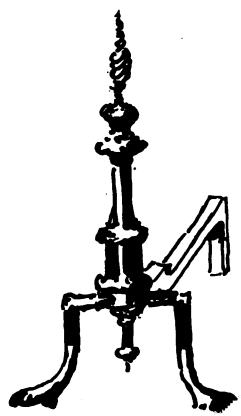
Fire-place in front is diminished may be seen. In fig. 4 the under part of the door-way by which the Chimney-sweeper gets up the Chimney is represented by white dotted lines. The door-way is represented closed.

I shall finish this chapter with some general observations relative to the subject under consideration; with directions how to proceed where such local circumstances exist as render modifications of the general plan indispensably necessary.

Whether a Chimney be designed for burning wood upon the hearth, or wood, or coals in a grate, the form of the Fire-place is, in my opinion, most perfect when the width of the back is equal to the depth of the Fire-place, and the opening of the Fire-place in front equal to three times the width of the back, or, which is the same thing, to three times the depth of the Fire-place.

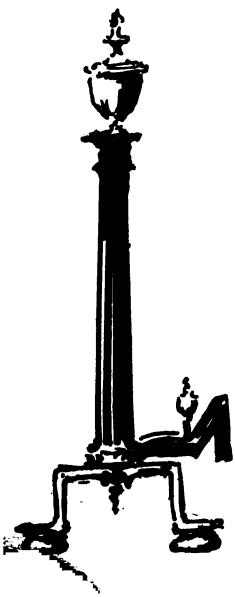
But if the Chimney be designed for burning wood upon the hearth, upon hand irons, or dogs, as they are called, it will be sometimes necessary to accommodate the width of the back to the length of the wood; and when this is the case, the covings must be



accommodated to the width of the back, and the opening of the Chimney in front.

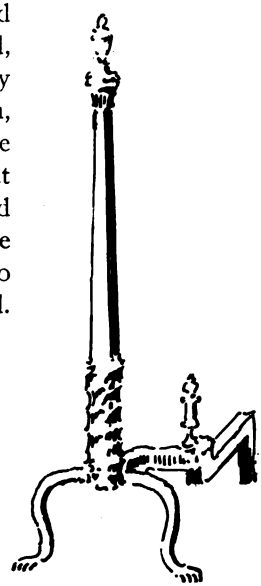
When the wall of the Chimney in front, measured from the upper part of the breast of the Chimney to the front of the mantle, is very thin, it may happen, and especially in Chimnies designed for burning wood upon the hearth, or upon dogs, that the depth of the Chimney, determining according to the directions here given, may be too small.

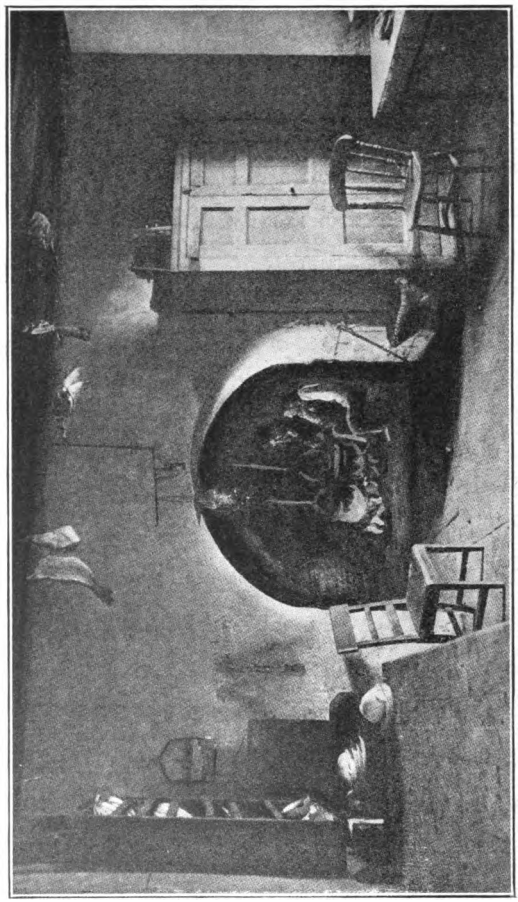
Thus, for example, supposing the wall of the Chimney in front. from the upper part of the breast of the Chimney to the front of the mantel, to be only four inches, (which is sometimes the case, particularly in rooms situated near the top of the house) in this case, if we take four inches for the width of the throat, this will give eight inches only for the depth of the Fire-place, which would be too little, even were coals to be burnt instead of wood. In this case I should increase the depth of the Fire-place at the hearth to 12 or 13 inches, and should build the back perpendicular to the height of the top of the burning fuel, (whether it be wood burned upon the hearth, or coals in a grate) and then, slop-



ing the back by a gentle inclination forward, bring it to its proper place, that is to say, perpendicularly under the back of the throat of the Chimney. This slope, (which will bring the back forward four or five inches, or just as much as the depth of the Fire-place is increased) though it ought not to be too abrupt, yet it ought to be quite finished at the height of eight or ten inches above the fire, otherwise it may perhaps cause the Chimney to smoke; but when it is very near the fire, the heat of the fire will enable the current of rising smoke to overcome the obstacle which this slope will oppose to its ascent, which it could not do so easily were the slope situated at a greater distance from the burning fuel.

Having been obliged to carry backward the Fire-place in the manner here described, in order to accommodate it to a Chimney whose walls in front were remarkably thin, I was surprised to find upon lighting the fire that it appeared to give out more heat into the room than any Fire-place I had ever constructed. This effect was quite unexpected; but the cause of it was too obvious not to be immediately discovered.





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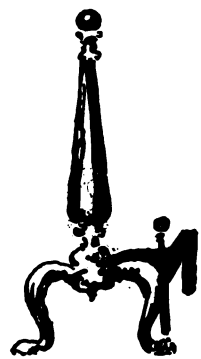
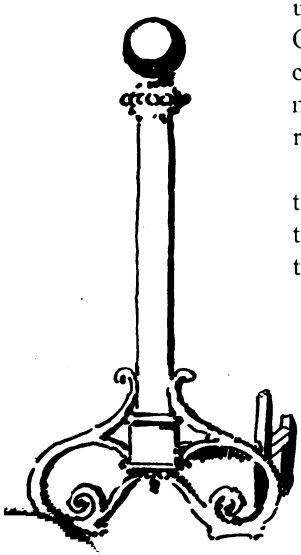
The flame rising from the fire broke against the part of the back which sloped forward over the fire, and this part of the back being soon very much heated, and in consequence of its being very hot, (and when the fire burnt bright it was frequently red hot), it threw off into the room a great deal of radiant heat. It is not possible that this oblique surface (the slope of the back of the Fire-place) could have been heated red hot merely by the radiant heat projected by the burning fuel, for other parts of the Fire-place nearer the fire, and better situated for receiving radiant heat, were never found to be so much heated; and hence it appears that the combined heat in the current of the smoke and hot vapor which arises from an open fire may be, at least in part, stopped in its passage up the Chimney, changed into radiant heat, and afterwards thrown into the room. This opens a new and very interesting field for experiment, and bids fair to lead to important improvements in the construction of Fire-places. I have of late been much engaged in these investigations, and am now actually employed daily in making a variety of experiments with grates



and Fire-places, upon different constructions, in the room I inhabit in the Royal Hotel in Pall Mall; and Mr. Hopkins of Greek St., Soho, Ironmonger to his Majesty, and Mrs. Hempel, at her Pottery at Chelsea, are both at work in their different lines of business, under my direction, in the construction of Fire-places upon a principle entirely new, and which, I flatter myself, will be found to be not only elegant and convenient, but very economical. But as I mean soon to publish a particular account of these Fire-places, with drawings and ample directions for constructing them, I shall not enlarge farther on the subject in this place. It may, however, not be amiss just to mention here, that these new invented Fire-places not being fixed to the walls of the Chimney, but merely set down upon the hearth, may be used in any open Chimney; and that Chimnies altered or constructed on the principles here recommended are particularly well adapted for receiving them.

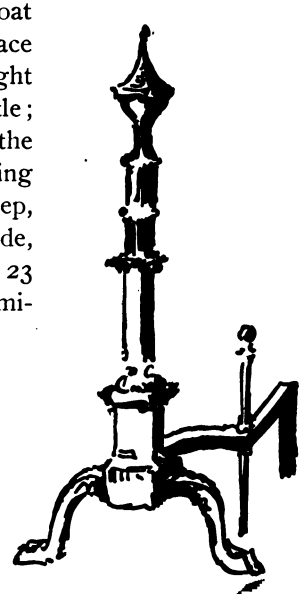


The public in general, and more particularly those tradesmen, and manufacturers whom it may concern, are requested to observe, that as the author does not in-

tend to take out himself, or such others to take out, any patent for any invention of his which may be of public utility, all persons are at full liberty to imitate them, and vend them for their own emolument, when and where, and in any way they may think proper; and those who may wish any further information respecting any of these inventions or improvements will receive (gratis) all the information they can require by applying to the author, who will take pleasure in giving them every assistance in his power.

Figs. 7, 8 and 9 show a plan, elevation, and section of a Fire-place constructed or altered upon this principle. The wall of the Chimney in front at a, fig. 9, being only four inches thick, four inches more added to it for the width of the throat would have left the depth of the Fire-place measured upon the hearth b c only eight inches, which would have been too little; a niche c and e, was therefore made in the new back of the Fire-place for receiving the grate, which niche was six inches deep, in the center of it, below 13 inches wide, (or equal in width to the grate) and 23 inches high; finishing above with a semi-

See page 163



THE FIREPLACE

Fig. 1

This view represents the ground plan of a Chinese fire-place in which the grate is placed in a niche, and in which the original width of the fire-place is considerably diminished.

The depth of the fire-place is read after the back of the grate, on which the grate is placed.

Fig. 2

Shows a front view of the same fire-place after the grate has been placed in position, and as seen from the door-way for the Chinese cook.

Fig. 3

Shows a section of the same fire-place, being a section of the grate and of the door-way for the Chinese cook, cutting by a line from front to back, and the new width of fire-place, on which the depth of the grate is read is diminished.

Fig. 7.

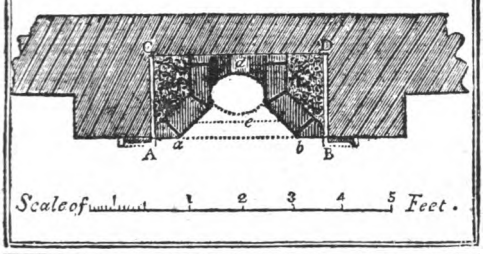
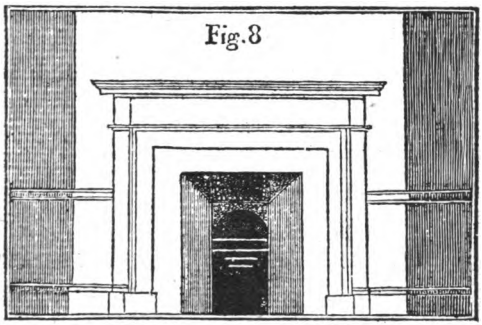


Fig. 8



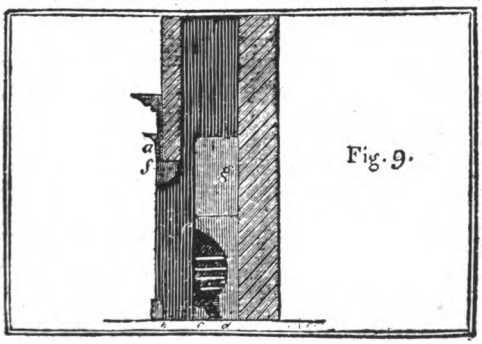


Fig. 9.

Fig. 7.

This figure represents the ground plan of a Chimney Fire-place in which the grate is placed in a niche, and in which the original width A B of the Fire-place is considerably diminished.

a b is the opening of the Fire-place in front after it has been altered, and d is the back of the niche in which the grate is placed.

Fig. 8.

Shows a front view of the same Fire-place after it has been altered; where may be seen the grate, and the door-way for the Chimney-sweeper.

Fig. 9.

Shows a section of the same Fire-place, c d e, being a section of the niche, g, the door-way for the Chimney-sweeper, closed by a piece of fire-stone, and f the new wall under the mantel by which the height of the opening of the Fire-place in front is diminished.

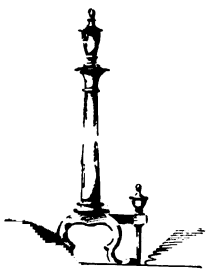


Fig. 7.

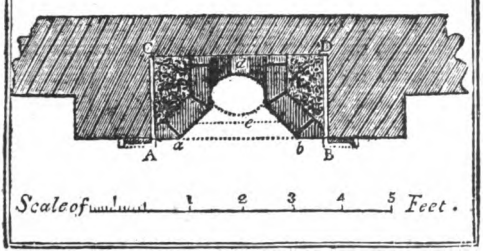
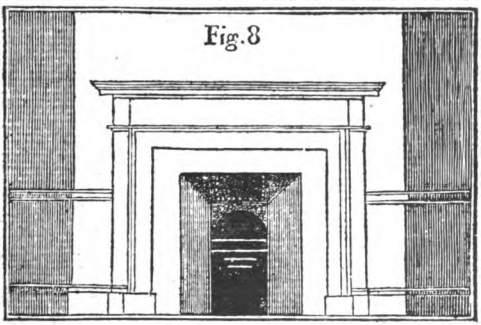


Fig. 8



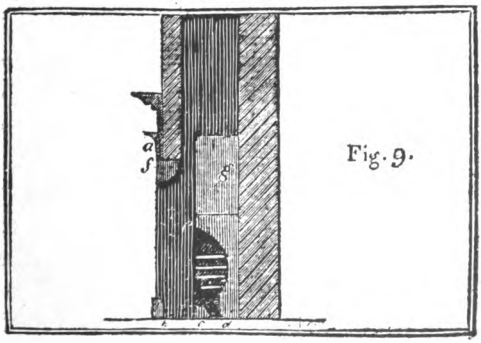
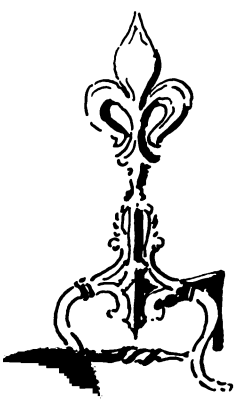


Fig. 9.

circular arch, which, in its highest part, rose seven inches above the upper part of the grate. The door-way for the Chimney-sweeper, which begins just above the top of the niche may be seen distinctly in both the figures 8 and 9. The space marked g, fig. 9, behind this doorway, may either be filled with loose bricks, or may be left void. The manner in which the piece of stone f, fig. 9, which is put under the mantel of the Chimney to reduce the height of the opening of the Fire-place, is rounded off on the inside in order to give a fair run to the column of smoke in its ascent through the throat of the Chimney, is clearly expressed in this figure.

The plan fig. 7, and elevation fig. 8, show how much the width of the opening of the Fire-place in front is diminished, and how the covings of the new Fire-place are formed.

A perfect idea of the form and dimension of the Fire-place in its original state, as also after its alteration, may be had by a careful inspection of these figures.



I have added the drawing Figure 10 merely to show how a fault, which I have found workmen in general whom I have

employed in altering Fire-places are very apt to commit, is to be avoided. In Chimnies like that represented in this figure, where the jamb A and B project far into the room, and where the front edge of the marble slab o, which forms the coving, does not come so far forward as the front of the jambs, the workmen in constructing the new covings are very apt to place them, not in the line c A, which they ought to do, but in the line c o, which is a great fault. The covings of a Chimney should never range behind the front of the jambs, however those jambs may project into the room; but it is not absolutely necessary that the covings should make a finish with the internal front corners of the jambs, or that they should be continued from the back c, quite to the front of the jambs at A. They may finish in front at a and b, and small corners A, o, a, may be left for placing the shovels, tongs, etc.

Were the new coving to range with the front edge of the old coving o, the obliquity of the new coving would be commonly too great; or the angle d c o would exceed 135 degrees, which it never should do, or at least by more than a very few degrees.

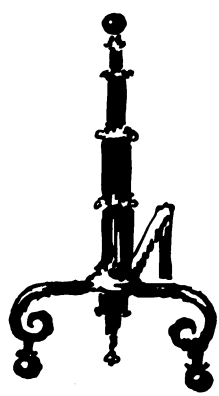


Fig. 10.

This figure shows how the covings are to be placed when the front of the covings (a and b) do not come so far forward as the front of the openings of the Fire-place, or the jambs (A and B).

Fig. 11.

This figure shows how the width and obliquity of the covings are to be accommodated to the width of the back of the Fire-place, in cases where it is necessary to make the back very wide.

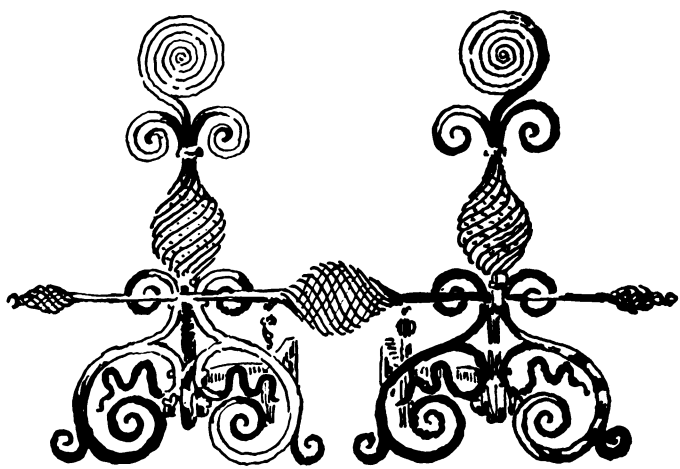


Fig. 10.

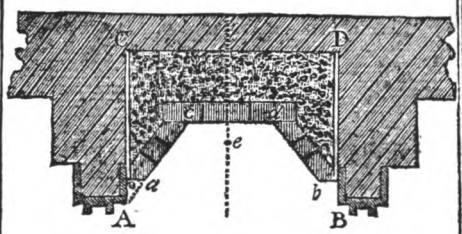
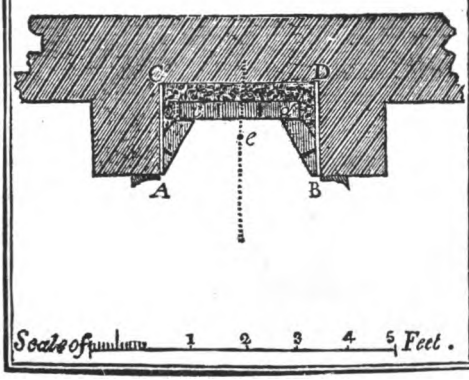


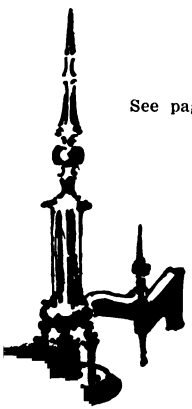
Fig. 11.



No inconveniences of any importance will arise from making the obliquity of the covings less than what is here recommended; but many cannot fail to be produced by making it much greater; and as I know from experience that workmen are very apt to do this, I have thought it necessary to warn them particularly against it.

Fig. 11 shows how the width and obliquity of the covings of a Chimney are to be accommodated to the width of the back, and to the opening in front and depth of the Fire-place, where the width of the opening of the Fire-place is less than three times the width of the new back.

As all those who may be employed in altering Chimnies may not, perhaps, know how to set off an angle, of any certain number of degrees, or may not have at hand the instruments necessary for doing it, I shall here show how an instrument may be made which will be found to be very useful in laying out the work for the bricklayers.



See page 171

Upon a board about 18 inches wide and 4 feet long, or upon the floor or a table, draw three equal squares, A, B, C, fig. 12, of about 12 or 14 inches each side, placed

in a straight line, and touching each other. From the back corner c of the center square B, draw a diagonal line across the square A, to its outward front corner f, and the adjoining angle formed by the lines d c and c f will be equal to 135 degrees, the angle which the plane of the back of a Chimney Fire-place ought to make with the plane of its covings. And a bevel, m, n, being made to this angle with thin slips of hard wood, this little instrument will be found to be very useful in marking out on the hearth, with chalk, the plans of the walls which are to form the covings of the Fire-places.

As Chimnies which are apt to smoke will require covings to be placed less obliquely in respect to the back than others which have not that defect, it would be convenient to be provided with several bevels; three or four, for instance, forming different angles. That already described, which may be called No. 1 will measure the obliquity of the covings when the Fire-place can be made of the most perfect form; another No. 2 may be made to a smaller angle, d c e, and another No. 3, for Chimnies which are very apt to smoke at the still smaller

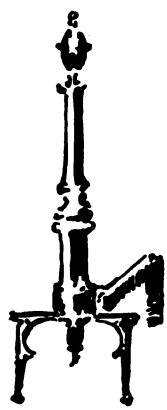


Fig. 12.

This figure shows how an instrument called a bevel (m n), useful in laying out the work, in altering Chimney Fire-places, may be constructed.

Fig. 13.

This shows how, when the breast of a Chimney (d) is too high, it may be brought down by means of a wall (b) placed under the mantel, and a coating of plaster, which in this figure is represented by the part marked by dots.

Fig. 14.

This shows how the breast of a Chimney may be brought down merely by a coating of plaster.

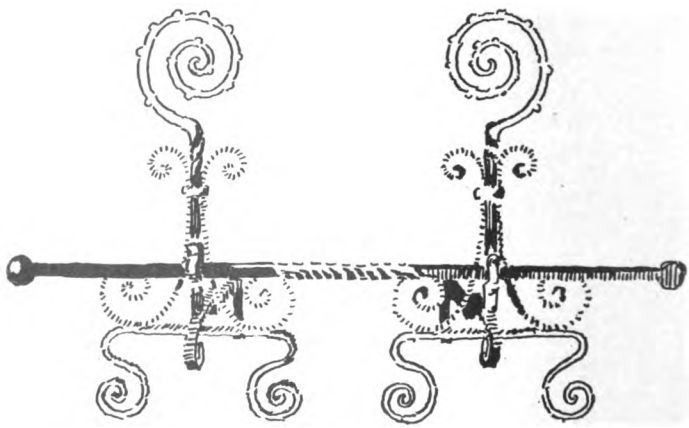
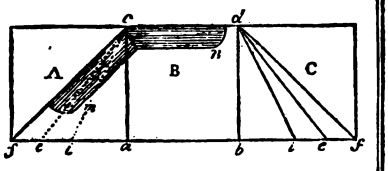


Fig. 12.



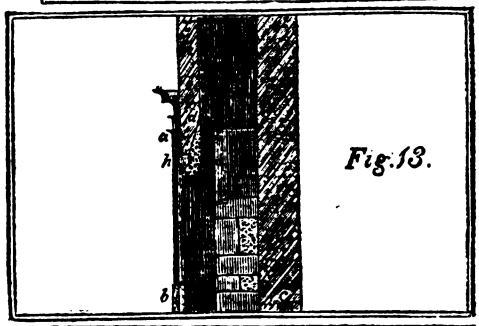


Fig. 13.

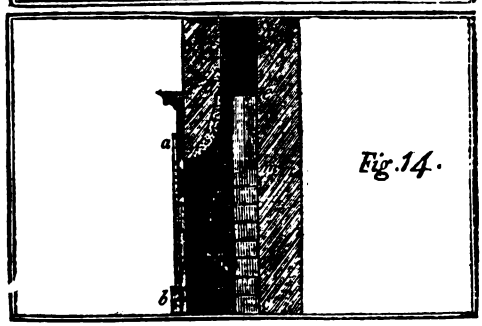
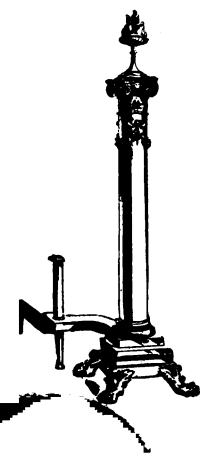


Fig. 14.

angle d c i; or a bevel may be so contrived, by means of a joint, and an arch, properly graduated, as to serve for all the different degrees of obliquity which it may ever be necessary to give to the covings of Fire-places.

Another point of much importance, and particularly in Chimnies which are apt to smoke, is to form the throat of the Chimney properly, by carrying up the back and covings to a proper height.

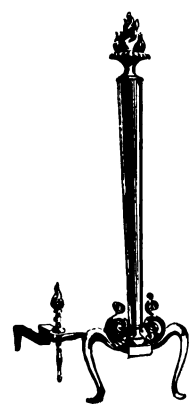
This, workmen are apt to neglect to do, probably on account of the difficulty they find in working where the opening of the canal of the Chimney is so much reduced. But it is absolutely necessary that these walls should be carried up five or six inches at least above the upper part of the breast of the Chimney, or to that point where the wall which forms the front of the throat begins to rise perpendicularly. If the workman has intelligence enough to avail himself of the opening which is formed in the back of the Fire-place to give a passage to the Chimney-sweeper, he will find little difficulty in finishing his work in the proper manner.

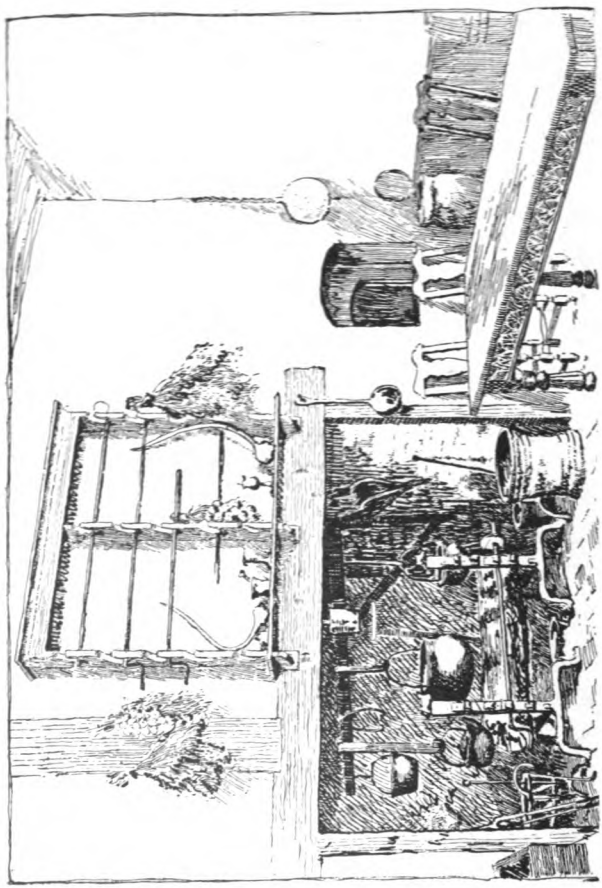


In placing the plumb-line against the

breast of the Chimney, in order to ascertain how far the new back is to be brought forward, great care must be taken to place it at the very top of the breast, where the canal of the Chimney begins to rise perpendicularly, otherwise, when the plumb-line is placed too low, or against the slope of the breast, when the new back comes to be raised to its proper height, the throat of the Chimney will be found to be too narrow.

Sometimes, indeed very often, the top of the breast of a Chimney lies very high, or far above the fire (see fig. 13 and 14, where d shows the top of the breast of the Chimney); when this is the case it must be brought lower, otherwise the Chimney will be very apt to smoke. So much has been said in the first chapter of this essay of the advantages to be derived from bringing the throat of a Chimney near to the burning fuel, that I do not think it necessary to enlarge on them in this place,—taking it for granted that the utility and necessity of that arrangement have already been made sufficiently evident; but a few directions for workmen, to show them how the breast (and consequently the throat)

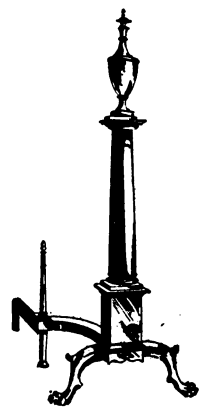




Washington's Old Open Fire-Place and Brick Oven at Mount Vernon.

of a Chimney can most readily be lowered, may not be superfluous.

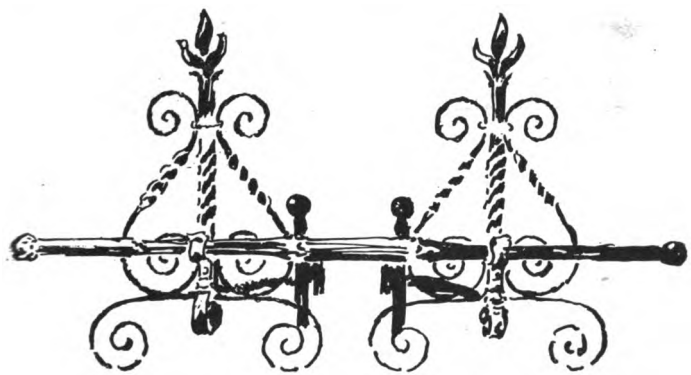
Where the too great height of the breast of a Chimney is owing to the great height of the mantel (fig. 13) or, which is the same thing, or the opening of the Fire-place in front, which will commonly be found to be the case; the only remedy for the evil will be to bring down the mantel lower; or rather, to make the opening of the Fire-place in front lower, by throwing across the top of this opening, from one jamb to the other, and immediately under the mantel, a very flat arch; a wall of bricks and mortar, supported on straight bars of iron; or a piece of stone (h, fig. 13). When this is done, the slope of the old throat of the Chimney, or of the back side of the mantel, is to be filled up with plaster, so as to form one continued flat, vertical, or upright plane surface with the lower part of the wall of the canal of the Chimney, and a new breast is to be formed lower down, care being taken to round it off properly, and make it finish at the lower surface of the new wall built under the mantle; which wall forms in fact a new mantel.



MODERN GREECE.

The annexed drawing, fig. 13, which represents the section of the Chimney in which the breast has been lowered according to the method here described, will show these various alterations in a clear and satisfactory manner. In this figure, as well as in most of the others in this essay, the old walls are distinguished from the new ones by the manner in which they are shaded; the old walls being shaded by diagonal lines, and the new ones by vertical lines. The additions, which are formed of plaster, are shaded by dots.

Where the too great height of the breast of a Chimney is occasioned, not by the height of the mantel, but by the too great width of the breast, in that case (which, however, will seldom be found to occur) this defect may be remedied by covering the lower part of the breast with a thick coating of plaster, supported, if necessary, by nails or studs, driven into the wall which forms the breast, and properly rounded off at lower part of the mantel. (See fig. 14.)



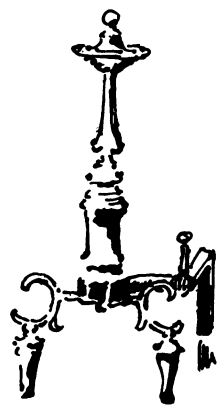
EARLY SIXTEENTH CENTURY FIRE-PLACE.

CHAPTER III.

Of the Cause of the Ascent of Smoke. ——Illustration of the subject by familiar Comparisons and Experiments. —— Of Chimnies which affect and cause each other to smoke.——Of Chimnies which smoke from want of air.——Of the Eddies of Wind which sometimes blow down Chimnies and cause them to smoke.

Though it was my wish to avoid all abstruse philosophical investigations in this essay, yet I feel that it is necessary to say a few words upon the subject generally considered as difficult to be explained, which is too intimately connected with the matter under consideration to be passed over in silence.

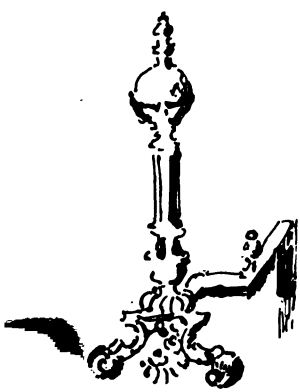
A knowledge of the cause of the ascent of smoke being indispensably necessary to those who engage in the improvement of Fire-places, or who are desirous of forming just ideas relative to the operations



of fire, and the management of heat, I shall devote a few pages to the investigation of that curious and interesting subject. And as many of those who may derive advantage from these inquiries are not much accustomed to philosophical disquisitions, and would not readily comprehend either the language or the diagrams commonly used by scientific writers to explain the phenomena in question, I shall take pains to express myself in the most familiar manner, and to use such comparisons for illustration as may be easily understood.

If small leaden bullets, or large goose shot, be mixed with peas, and the whole well shaken in a bushel, the shot will separate from the peas, and will take its place at the bottom of the bushel; forcing by its greater weight the peas, which are lighter, to move upwards, contrary to their natural tendency, and take their places above.

If water and linseed oil, which is lighter than water, be mixed in a vessel by shaking them together, upon suffering this mixture to remain quiet, the water will descend and occupy the bottom of the vessel, and the oil, being forced out of its place by the greater pressure downwards of the heavier liquid,



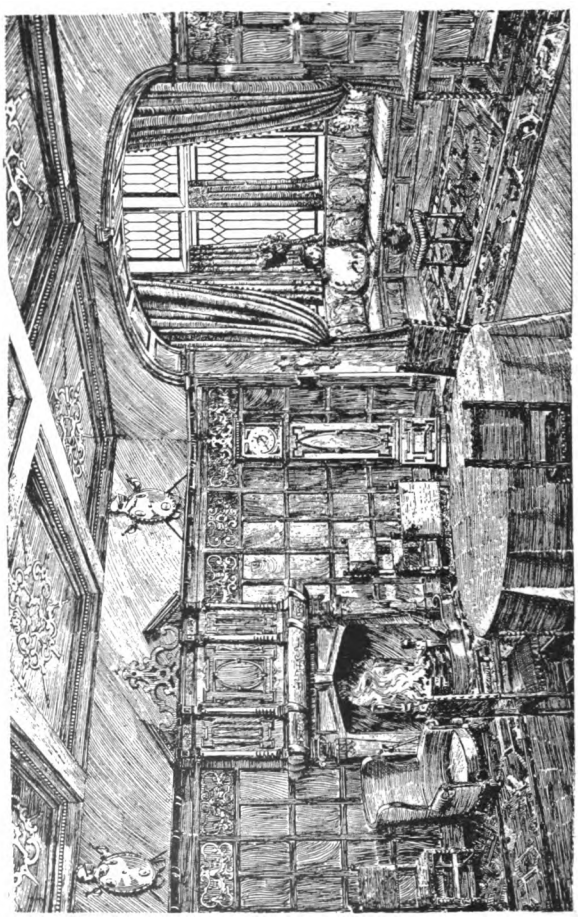
will be obliged to rise and swim on the surface of the water.

If a bottle containing linseed oil be plunged in water with its mouth upwards, and open, the oil will ascend out of the bottle, and passing upwards through the mass of water, in a continued stream, will spread itself over its surface.

In like manner, when two fluids of any kind, of different densities, come into contact, or are mixed with each other, that which is lighter will be forced upwards by that which is the heavier.

And as heat rarefies all bodies, fluids as well as solids, air as well as water, or mercury,—it follows that two portions of the same fluid, at different temperatures, being brought into contact with each other, that portion which is the hottest being more rarefied, or specifically lighter than that which is colder, must be forced upwards by this last, and that is what always happens in fact.

When hot water and cold water are mixed, the hottest part of the mixture will be found to be at the surface above; and when cold air is admitted into a warmed room, it will always be found to take its

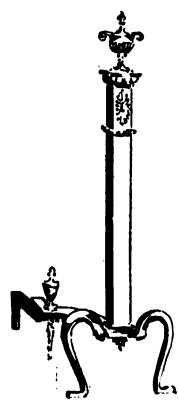


ELIZABETHAN FIRE-PLACE.

place at the bottom of the room, the warmer air being in part expelled, and in part forced upwards to the top of the room.

Both air and water being transparent and colorless fluids, their internal motions are not easily discovered by the sight; and when these motions are very slow, they make no impression whatever on any of our senses, consequently they cannot be detected by us without the aid of some mechanical contrivance: But when we have reasons to think that these motions exist, means should be sought, and may often be found, for rendering them perceptible.

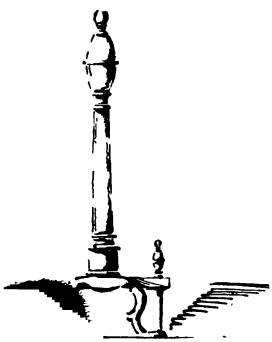
If a bottle containing hot water tinged with logwood, or any other coloring drug, be immersed, with its mouth open, and upwards, into a deep glass jar filled with cold water, the ascent of the hot water from the bottle through the mass of cold water will be perfectly visible through the glass. Now nothing can be more evident than that both of these fluids are forced, or pushed, and not drawn upwards. Smoke is frequently said to be drawn up the Chimney; and that a Chimney draws well, or ill; but these are careless expressions, and lead to very erroneous ideas respecting the cause of the as-



cent of Smoke, and consequently tend to prevent the progress of improvements in the management of the fires. The experiment just mentioned with the colored water is very striking and beautiful, and it is well calculated to give a just idea of the cause of the ascent of the smoke. The cold water in the jar, which, in consequence of its superior weight or density, forces the heated or rarefied water in the bottle to give way to it, and to move upwards out of its way, may represent the cold air of the atmosphere, while the rising column of colored water will represent the column of smoke which ascends from a fire.

If smoke required a Chimney to draw it upwards, how happens it that smoke rises from a fire which is made in the open air, where there is no Chimney?

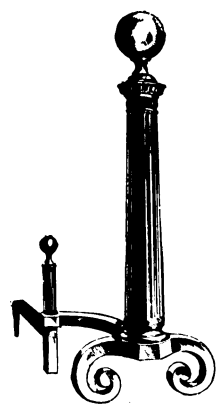
If a tube, open at both ends, and of such a length that its upper end be below the surface of the cold water in the jar, be held vertically over the mouth of the bottle which contains the hot colored water, the hot water will rise up through it, just as smoke rises in a Chimney.

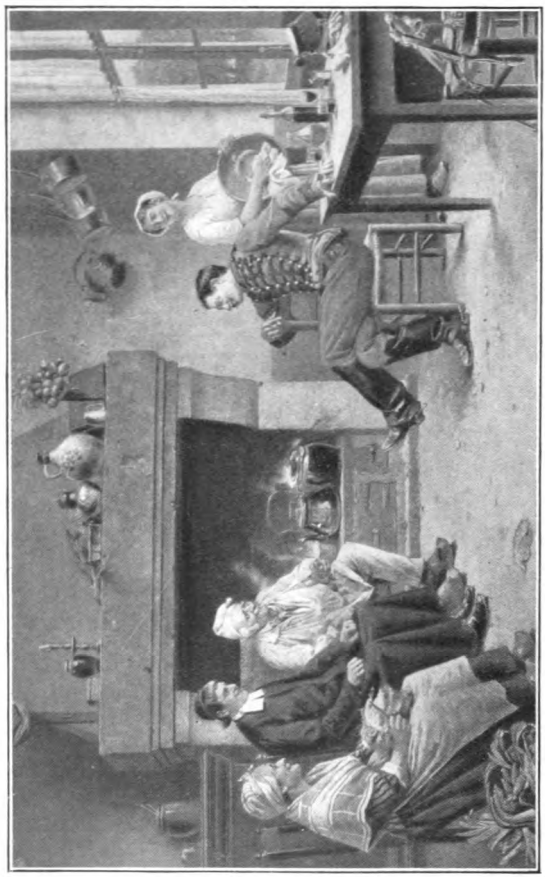


If a tube be previously heated before it is plunged in the cold water, the ascent of the

hot colored water will be facilitated and accelerated, in like manner as smoke is known to rise with greater facility in a Chimney which is hot than in one in which no fire has been made for a long time. But in neither of these cases can it be said, that the hot water is drawn up the tube. The hotter the water in the bottle is, and the colder that in the jar, the greater will be the velocity with which the hot water will be forced up through the tube, and the same holds of the ascent of hot smoke in a Chimney. When the fire is intense and the weather very cold, the ascent of the smoke is very rapid; and under such circumstances Chimnies seldom smoke.

As the cold water of the jar immediately surrounding the bottle which contains the hot water will be heated by the bottle while the other parts of the water in the jar will remain cold, this water so heated, becoming specifically lighter than that which surrounds it, will be forced upwards; and if it finds its way into the tube, will rise up through it with the colored hot water. The warmed air of a room heated by an open Chimney Fire-place has always a tendency to rise, (if I may use that in-



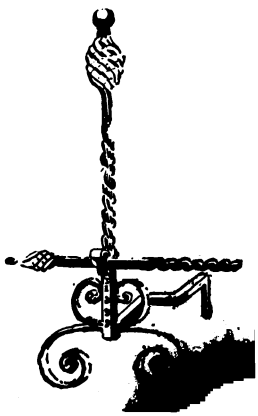


An Old French Fire-Place Tells Its Own Story.

accurate expression) and finding its way into the Chimney frequently goes off with the smoke.

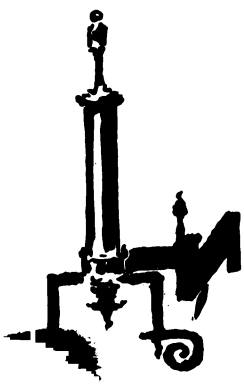
What has been said, will, I flatter myself, be sufficient to explain and illustrate in a clear and satisfactory manner the cause of the ascent of the smoke; and just ideas upon that subject are absolutely necessary in order to judge, with certainty, of the merit of any scheme proposed for the improvement of Fire-places; or to take effectual measures, in all cases, for curing smoking Chimnies. For, though the perpetual changes and alterations which are produced by accident, whim, and caprice, do sometimes lead to useful discoveries, yet the progress of improvements under such guidance must be exceedingly slow, fluctuating and uncertain.

As to the causes of the smoking of Chimnies, they are very numerous, and various; but as a general idea of them may be acquired from what has already been said upon that subject in various parts of the essay, and as they may, in all cases (a very few only excepted) be completely remedied by making the alterations in Fire-places here pointed out, I do not think it



necessary to enumerate them all in this place, or to enter into those long details and investigations which would be required to show the precise manner in which each of them operates, either alone, or in conjunction with others.

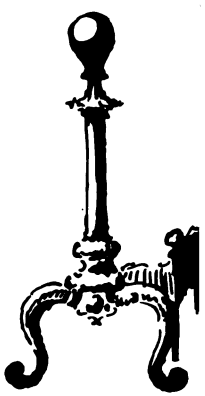
There is, however, one cause of smoking Chimnies which I think it is necessary to mention more particularly. In modern built houses, where the doors and windows are generally made to close with such accuracy that no crevice is left for the passage of air from without, the Chimnies in rooms adjoining to each other, or connected by close passages, are frequently found to affect each other, and this is easy to be accounted for. When there is a fire burning in one of the Chimnies, as the air necessary to supply the current up the Chimney where the fire burns cannot be had in sufficient quantities from without, through the very small crevices of the doors and windows, the air in the room becomes rarefied, not by heat, but by subtraction of that portion of air which is employed in keeping up the fire, or supporting the combustion of the fuel, and in consequence of this rarefication, its elasticity is diminished, and being at last

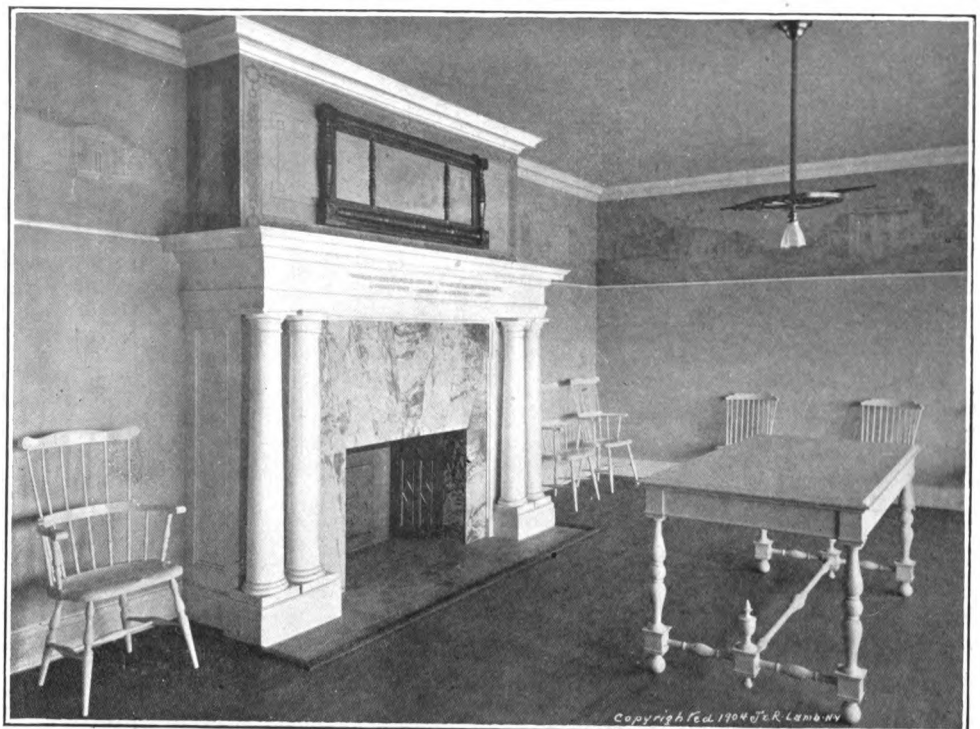


overcome by the pressure of the external air of the atmosphere, this external air rushes into the room by the only passage left for it, namely, by the open Chimney of the neighboring room; and the flow of air into the Fire-place and up the Chimney where the fire is burning, being constant, this expense of air is supplied by a continued current down the other Chimney.

If an attempt be made to light fires in both Chimnies at the same time, it will be found to be very difficult to get the fires to burn, and the rooms will be both filled with smoke.

One of the fires,—that which is made in the Chimney where the construction of the Fire-place is best adapted to facilitate the ascent of the smoke, or if both Fire-places are on the same construction, that which has the wind most favorable, or in which the fire happens to be soonest kindled, will overcome the other, and cause its smoke to be beat back into the room by the cold air which descends through the Chimney. The most obvious remedy in this case is to provide for the supply of fresh air necessary to keeping up the fires by opening a passage for the external air into the room by





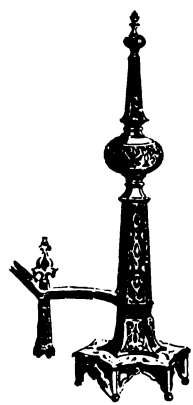
Old Colonial Pure and Simple.
Orchard, Lansing & Joraleman, Architects.

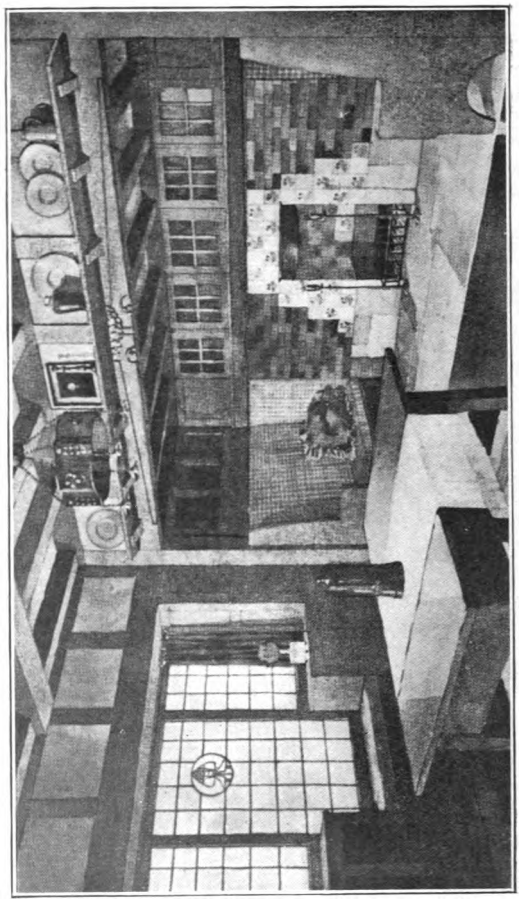
a shorter road than down one of the Chimnies; and when this is done both Chimnies will be found to be effectually cured.

But the Chimnies so circumstanced may very frequently be prevented from smoking without opening any new passage for the external air, merely by diminishing the draught, (as it is called) up the Chimnies; which can be best done by altering both Fire-places upon the principles recommended and fully explained in the foregoing chapters of this essay.

Should the doors and windows of a room be closed with so much nicety as to leave no crevices by which a supply of air can enter sufficient for maintaining the fire, after the current of air up the Chimney has been diminished as much as possible by diminishing the throat of the Fire-place; in that case there would be no other way of preventing the Chimney from smoking but by opening a passage for the admission of fresh air from without; but this, I believe, will very seldom be found to be the case.

A case more frequently to be met with is, where currents of air set down Chimnies in consequence of a diminution and rarefaction of the air in a room, occasioned





A MODERN DUTCH TREATMENT.

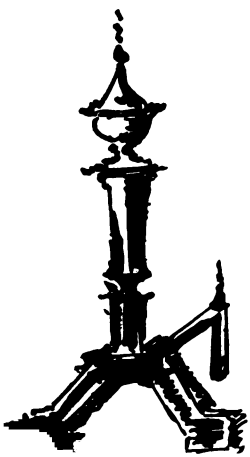
by the doors of the room opening into passages or courts where the air is rarefied by the action of some particular winds. In such cases the evil may be remedied, either by causing the doors in question to close more accurately, or, (which will be still more effectual) by giving a supply of air to the passage or court which wants it, by some other way.

Where the top of a Chimney is commanded by high buildings, by cliffs, or by high grounds, it will frequently happen, in windy weather, that the eddies formed in the atmosphere by these obstacles will blow down the Chimney, and beat down the smoke into the room. This it is true will be much less likely to happen when the throat of the Chimney is contracted and properly formed than when it is left quite open, and the Fire-place badly constructed; but as it is possible that a Chimney may be so much exposed to these eddies in very high winds as to be made to smoke sometimes when the wind blows with violence from a certain quarter it is necessary to show how the effects of those eddies may be prevented.

Various mechanical contrivances have been imagined for preventing the wind

from blowing down Chimnies, and many of them have found to be useful; there are, however, many of these inventions, which, though they prevent the wind from blowing down the Chimney, are so ill-contrived on other accounts as to obstruct the ascent of the smoke, and do more harm than good.

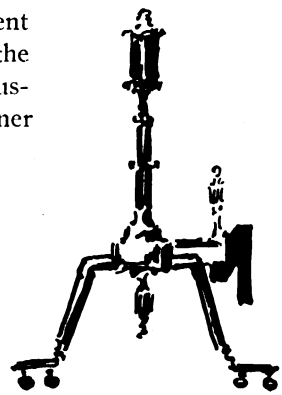
Of this description are all those Chimney pots with flat horizontal plates or roofs placed upon supporters just above the opening of the pot; and most of the caps which turn with the wind are not much better. One of the most simple contrivances that can be made use of, and which in most cases will be found to answer the purpose intended as well or better than more complicated machinery, is to cover the top of the Chimney with a hollow truncated pyramid or cone, the diameter of which above, or opening for the passage of the smoke, is about 10 or 11 inches. This pyramid or cone (for either will answer) should be of earthen ware, or of cast iron; its perpendicular height may be equal to the diameter of its opening above, and the diameter of its opening below equal to three times its height. It should be placed upon the top of the Chimney, and it may be contrived so

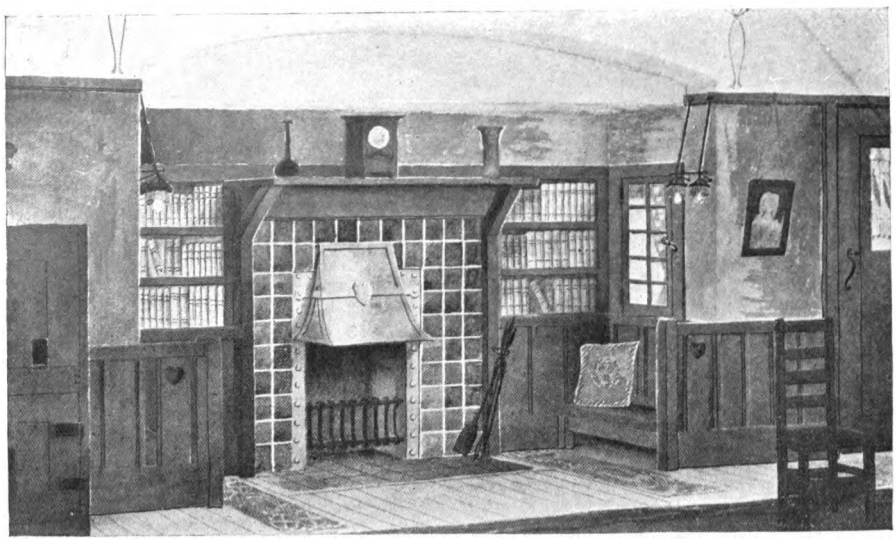


as to make an handsome finish to the brick-work. Where several flews come out near each other, or in the same stock of Chimnies, the form of a pyramid will be better than that of a cone for these covers.

The intention of this contrivance is, that the winds and eddies which strike against the oblique surface of these covers may be reflected upwards instead of blowing down the Chimney. The invention is by no means new, but it has not hitherto been often put into practice. As often as I have seen it tried it has been found to be of use; I cannot say, however, that I was ever obliged to have recourse to it, or to any similar contrivance; and if I forbear to enlarge upon the subject of these inventions, it is because I am persuaded that when Chimnies are properly constructed in the neighborhood of the Fire-place, little more will be necessary to be done at the top of the Chimney than to leave it open.

I cannot conclude this essay without again recommending, in the strongest manner, a careful attention to the management of fires in open Chimnies; for not only the quantity of heat produced in the combustion of fuel depends much on the manner





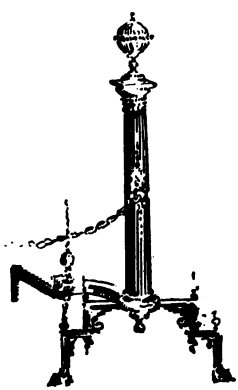
Ingle Nook in Living Room. E. G. W. Dietrich, Architect.

in which the fire is managed, but even of the heat actually generated a very small part only will be saved, or usefully employed, when the fire is made in a careless and slovenly manner.

In lighting a coal fire, more wood should be employed than is commonly used, and fewer coals; and as soon as the fire burns bright, and the coals are well lighted, and not before, more coals should be added to increase the fire to its proper size.

The enormous waste of fuel in London may be estimated by the vast dark cloud which continually hangs over this great metropolis, and frequently overshadows the whole country, far and wide; for this dense cloud is certainly composed almost entirely of unconsumed coal, which, having stolen wings from the innumerable fires of this great city, has escaped by the Chimnies, and continues to sail about in the air, till, having lost the heat which gave it volatility, it falls in a dry shower of extremely fine black dust to the ground, obscuring the atmosphere in its descent, and frequently changing the brightest day into more than Egyptian darkness.

I never view from a distance, as I come



into town, this black cloud which hangs over London, without wishing to be able to compute the immense number of chaldrons of coals of which it is composed; for could this be ascertained, I am persuaded so striking a fact would awaken the curiosity and excite the astonishment of all ranks of the inhabitants; and perhaps turn their minds to an object of economy to which they have hitherto paid little attention.

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CONCLUSION.

Though the saving of fuel, which will result from the improvements in the forms of Chimney Fire-places here recommended, will be very considerable, yet I hope to be able to show in a future essay, that still greater savings may be made, and more important advantages derived from the introduction of improvements I shall propose in kitchen Fire-places.

I hope likewise to be able to show in an essay on "Cottage Fire-places," which I am now preparing for publication, that three-quarters, at least, of the fuel which cottages now consume in cooking their victuals, and in warming their dwellings, may with great ease, and without any expensive apparatus, be saved.

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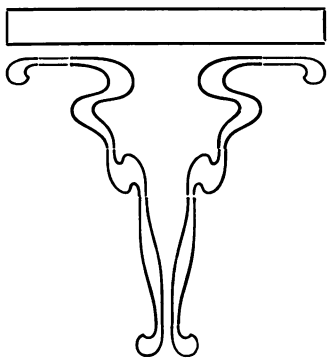
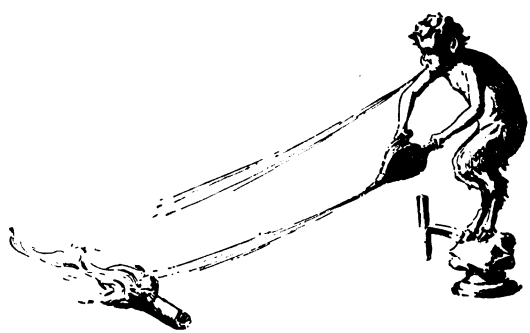
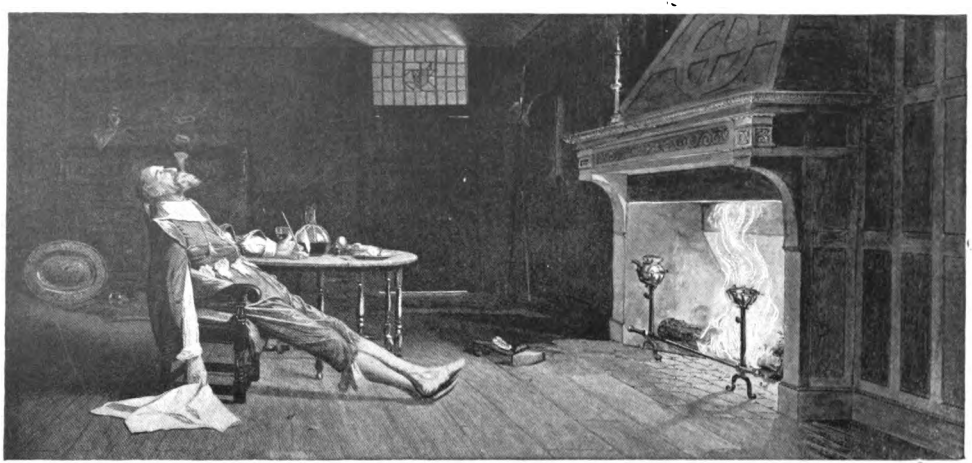


"THE HEARTH STONE IS THE CORNER STONE OF THE NATION'S WEAL."





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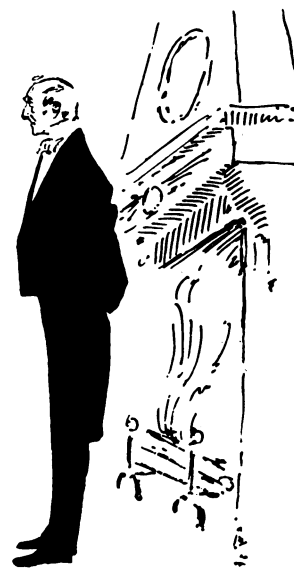
FIREPLACES

OLD Fashioned Rumford Fireplaces, guaranteed to heat and ventilate without smoking. Manufactured of asbestite slabs. Crated and ready for immediate shipment to any part of the world.

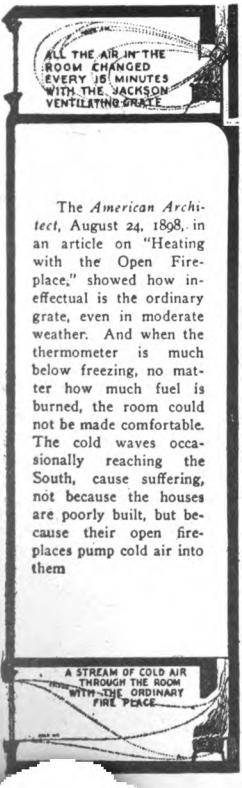
Write for catalogue of sizes and prices. Install these forms in fireplaces already built, and under no circumstances build new fireplaces without them. G. Curtis Gillespie, M.E., Architect, 7 Warren St., New York, N. Y., U. S. A.



THE JACKSON VENTILATING GRATE.

IT is acknowledged by all authorities on the subject that the most healthful heat is that of the open fireplace. For this reason the open grate has always been a favorite in our homes, and it is only because in the ordinary form it is such a great consumer of fuel, and so feeble in its heating capacity, that it has been supplanted by more economical kinds of heating apparatus.

The construction of the Jackson Ventilating Grate remedies this defect, and while giving all the cheer and beauty of the open fire, over four times the usual amount of heat is secured. This is done by means of heat-saving chambers at the back, sides and top, so that the warmth that in the ordinary fireplace is lost in the brickwork and up the chimney is in this system brought into the room in the form of warm air. Because of the warm, pure air introduced through the frame of the grate itself, the ventilation is far superior to other forms of open fires and the usual cold drafts are stopped.


ALL THE AIR IN THE ROOM CHANGED EVERY 15 MINUTES WITH THE JACKSON VENTILATING GRATE
The *American Architect*, August 24, 1898, in an article on "Heating with the Open Fireplace," showed how ineffectual is the ordinary grate, even in moderate weather. And when the thermometer is much below freezing, no matter how much fuel is burned, the room could not be made comfortable. The cold waves occasionally reaching the South, cause suffering, not because the houses are poorly built, but because their open fireplaces pump cold air into them
A STREAM OF COLD AIR THROUGH THE ROOM WITH THE ORDINARY FIRE PLACE

Send for catalogue showing construction, designs and sizes; also for catalogue of mantels, andirons and other fixtures. Edwin A. Jackson & Bro., 50 Beekman Street, New York.

VENTILATING GRATE.

The Ventilating Grate is made in two forms; one heating one room only, the other (as shown in cut) heating on two floors.

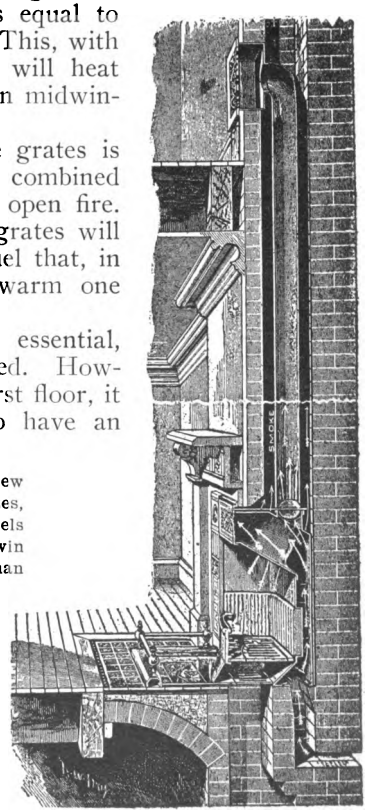
Air entering at the cold air inlet is heated as it passes over the back, and enters the room through the register in the front of the grate, and passes also to the room on the floor above. The heat may all be turned upstairs if desired, or part to each room.

Two rooms on the floor above may be heated if they are not unusually large. The volume of warm air entering is equal to over 180 cubic feet per minute. This, with the radiation from No. 3 size, will heat about 7,000 cubic feet of space in midwinter.

The principle applied in these grates is the same as that of the furnace, combined with the direct radiation of the open fire. The result is that one of these grates will heat two or three rooms with fuel that, in an ordinary grate, would not warm one room.

The ashpit connection is not essential, and an ashpan is sent if preferred. However, when the Grate is on the first floor, it will be found a convenience to have an ashpit, as shown.

Send for catalogue showing view of the heating chambers, sizes, etc.; also for catalogue of mantels and other fireplace fixtures. Edwin A. Jackson & Bro., 50 Beekman Street, New York.



Section of the Jackson Ventilating Grate.

FOR GRATES HAVING ASHPITS.

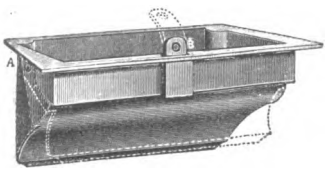
It is the experience of all who use grates connected with ashpits, that even when the masonry of the pit is well constructed, an intolerable nuisance of dust and ashes is experienced whenever the fire is raked. This arises from the fact that when hot ashes are dropped into the cold air of the pit, an upward current is started, which wafts the ashes into the room.

The Jackson Ashtrap prevents this upward escape of dust, and it is the only ashtrap or ashpit cover that will. It consists, as is shown, of a rectangular box, the bottom of which fits obliquely upon it, being so arranged that by a slight pressure with a poker on the projection B, the bottom, or valve, is withdrawn from under the ashes, and assumes the position shown by the dotted lines. When the pressure is removed from B the valve instantaneously closes, excluding all dust from the room. The ashes can remain in the trap until cool. It is dumped with the slightest pressure, the action is "as quick as a wink," and never fails to be effective.

This trap can be used in any open fireplace having an ashpit, in which case a border is supplied for holding the trap in the hearth. Border, 11½″ long and 9″ wide; Trap, 9½″ long and 7″ wide.

Cost is, net, $2.00.

Send for catalogue of dampers, ashpit doors and ashtraps. Edwin A. Jackson & Bro., 50 Beekman Street, New York.



Construction of the Jackson Ashtrap.

VENTILATING GRATE.

FRANKLIN STOVES

In 1742 Benjamin Franklin invented "an open stove for the better warming of rooms," which apparatus he named the "Pennsylvania Fireplace." While primarily an open stove, the appearance was that of an open grate, as the "machine" (as Franklin termed it) was connected with a regular fireplace, and in a regular mantelpiece.

Those who want the cheer and beauty of the open grate in a room where there is no fireplace will have their wants filled, for these Franklins can be connected by a stove pipe with any chimney. The Franklins give much more heat than does the ordinary grate, and especially when they stand out in the room, as did the originals.

The design here shown is a copy of a Colonial pattern. It is made in three sizes. They are arranged for wood or coal or gas. The coal grate can be lifted out and andirons for wood be substituted.

Send for catalogue showing sizes and other designs. Edwin A. Jackson & Bro., 50 Beekman Street, New York.

The Mayflower Franklin.